Supplemental Information Requested
For North Carolina's
Early Action Compact Areas

April 8, 2004

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Planning Section

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1 Model Performance Evaluation

There are many aspects of model performance. This section will focus primarily on the methods and techniques recommended by EPA for evaluating the performance of the air quality model. The meteorological modeling evaluation is documented in the June 30, 2003 Early Action Compact (EAC) Progress Report and was submitted with the March 31, 2004 Early Action Plan. Therefore, the meteorological modeling evaluation will not be discussed here.

The first step in the modeling process is to verify the model's performance in terms of its ability to predict the ozone in the right locations and at the right levels. To do this, the model predictions are compared to the ambient data observed in the historical episode. This verification is a combination of statistical and graphical evaluations. If the model appears to be producing ozone in the right locations for the right reasons, then the model can be used as a predictive tool to evaluate various control strategies and their effects on ozone. The purpose of the model performance evaluation is to assess how accurately the model predicts ozone levels observed in the historical episode. The key statistical measures that were used to evaluate model performance are as follows:

1. Comparison of modeled mean of ozone to the observed mean of ozone. This metric is an evaluation of how, on average across the episode, the model compares to the observed values.

2. Bias in the model which is calculated by taking the difference between the modeled mean and the observed mean.

3. Normalized bias is calculated by taking the bias for each observation/prediction pair, and then dividing by the number of pairs that are used in the calculations. EPA recommends that normalized bias fall between ± 5 – 15 percent.

4. Gross error. For the entire modeling domain, gross error for all pairs above 60 ppb of ozone was calculated. For the EAC areas, the gross error was calculated on the daily 8-hour ozone maximums. US EPA guidance suggests that gross error can be interpreted as precision of the model. This metric is typically used to compare various modeling applications. EPA recommends that the gross error of all pairs >60 ppb be less than 30-35 percent.

These statistics will be presented in the sections that follow for the entire modeling domain and for each EAC area.

Another method of evaluating model performance is reviewing spatial plots and time series plots of the modeled versus observed data. These graphical plots aid in getting a better understanding of how the model is performing over the whole domain.

1.1 Domain-Wide Performance

The statistical data calculated for the 4-km and 12-km domains are presented in Tables 1 and 2. The normalized bias was well within the recommended ± 5-15 percent, and the gross error was significantly below the 30-35 percent range at the 40 and 60 ppb thresholds. These statistical metrics were used as a first screening of the model performance.

Table 1. Model Statistics at 4 km

Episode/Domain, Threshold	Modeled Mean (ppb)	Observed Mean (ppb)	Bias (ppb)	Nbias (%)	Gross Error (%)
1995/4 km, 60 ppb	75.67	78.95	-3.27	3.1	16.0
1995/4 km, 40 ppb	70.84	70.62	0.23	-3.3	19.4
1996/4 km, 60 ppb	71.24	75.85	-4.61	4.8	14.9
1996/4 km, 40 ppb	65.48	64.43	1.04	-4.9	21.2
1997/4 km, 60 ppb	70.69	79.27	-8.58	10.3	17.5
1997/4 km, 40 ppb	63.96	68.51	-455	4.3	21.1

Table 2. Model Statistics at 12 km

Episode/Domain, Threshold	Modeled Mean (ppb)	Observed Mean (ppb)	Bias (ppb)	Nbias (%)	Gross Error (%)
1995/12 km, 60 ppb	72.27	77.12	-4.85	0.05.3	18.6
1995/12 km, 40 ppb	67.41	67.53	-0.12	-3.0	22.6
1996/12 km, 60 ppb	70.86	74.95	-4.09	4.5	17.4
1996/12 km, 40 ppb	63.89	63.41	0.49	-3.3	23.2
1997/12 km, 60 ppb	76.25	76.55	-0.29	-0.2	17.8
1997/12 km, 40 ppb	69.06	65.82	3.23	-7.3	23.3

1.1.1 1995 Episode

Spatial Plots

Below are the domain-wide spatial plots of modeled 1-hr and 8-hr max ozone with the observations overlaid for July 12-15 of the 1995 episode (Figures 1-2). Overall, the model does well with the spatial extent of the higher ozone concentrations. The model does under predict the 1-hr max ozone concentration in the northeast portion of the domain on the 15th, but does a fairly good job capturing the higher ozone concentrations near the Charlotte region on the 14th. Model performance for the 8-hr max ozone is similar to that for the 1-hr max. The model did over predict ozone in the Charlotte region on the 13th and in the Triad on the 15th, but model performance was relatively good throughout the most of the domain. In general, the model does not have any major over predictions or under predictions, and we believe the model does an acceptable job capturing the spatial distribution and concentration of ozone.

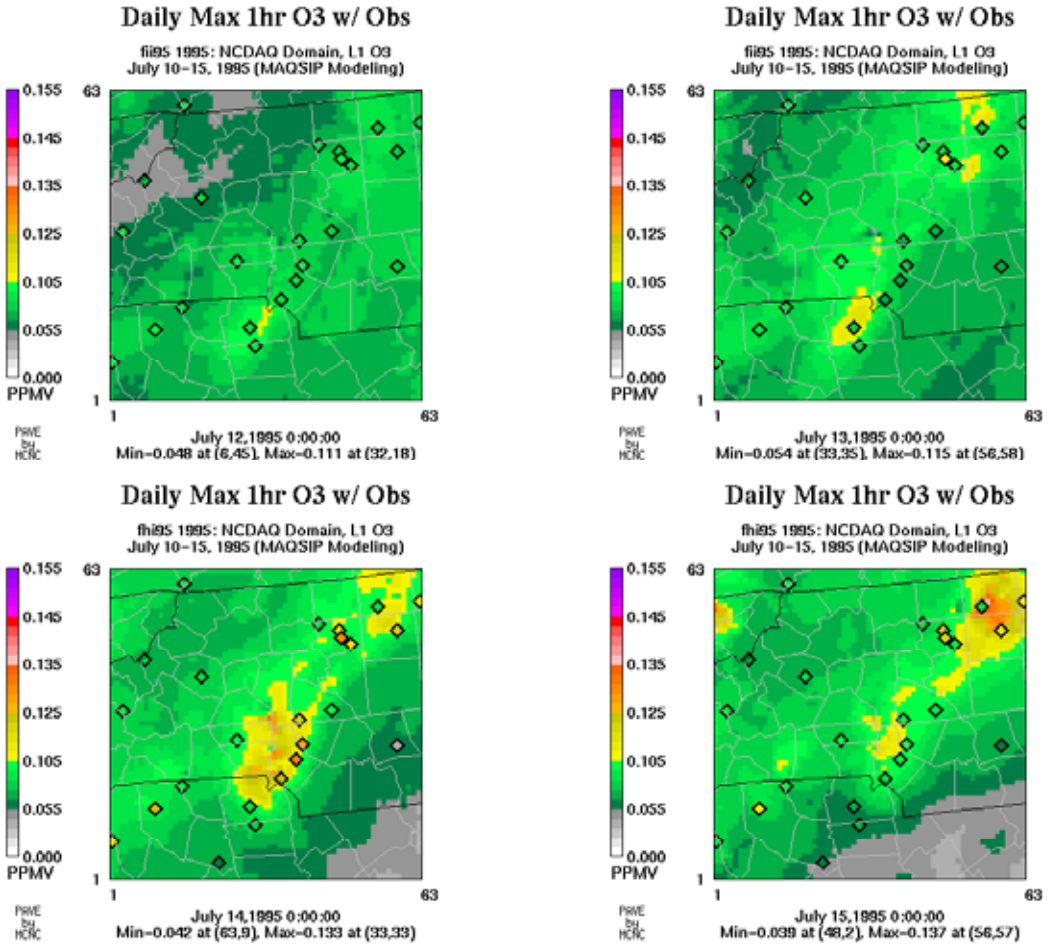


Figure 1. Spatial plots for model predicted and observed peak 1-hr ozone concentrations for July 12-15, 1995.

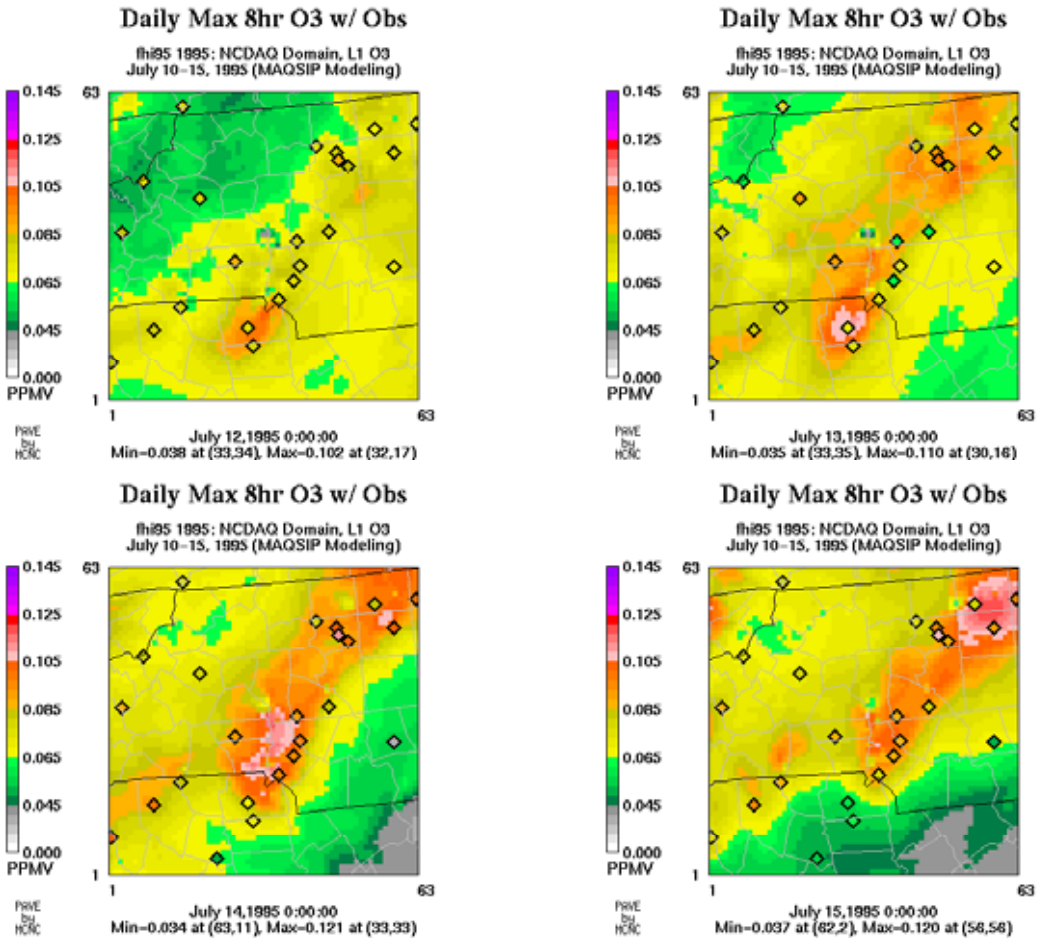


Figure 2. Spatial plots for model predicted and observed peak 8-hr ozone concentrations for July 12-15, 1995.

Scatter Plots

Below are scatter plots of modeled predicted ozone versus observed ozone for 1-hr and 8-hr model performance for July 12-15, 1995 (Figure 3). Although there are some outliers, the overall performance is good for the 1995 episode. The majority of the points fall with the acceptable limits of good model performance.

4 km Domain Time Series

Below are time series plots of model predicted ozone (green) and observed ozone (red) for the entire 1995 episode (Figures 4 through 6). The first plot represents an ozone concentration threshold of 60 ppb, the second plot of 40 ppb, and the third plot of 5 ppb. The model tends to under predict ozone on the 12th and 14th, while doing a good job capturing the peak ozone on the 13th and 15th. The model does a good job capturing the ozone cycle on several days at the 40 ppb threshold, while at the 5 ppb threshold the model over predicts ozone during the overnight hours.

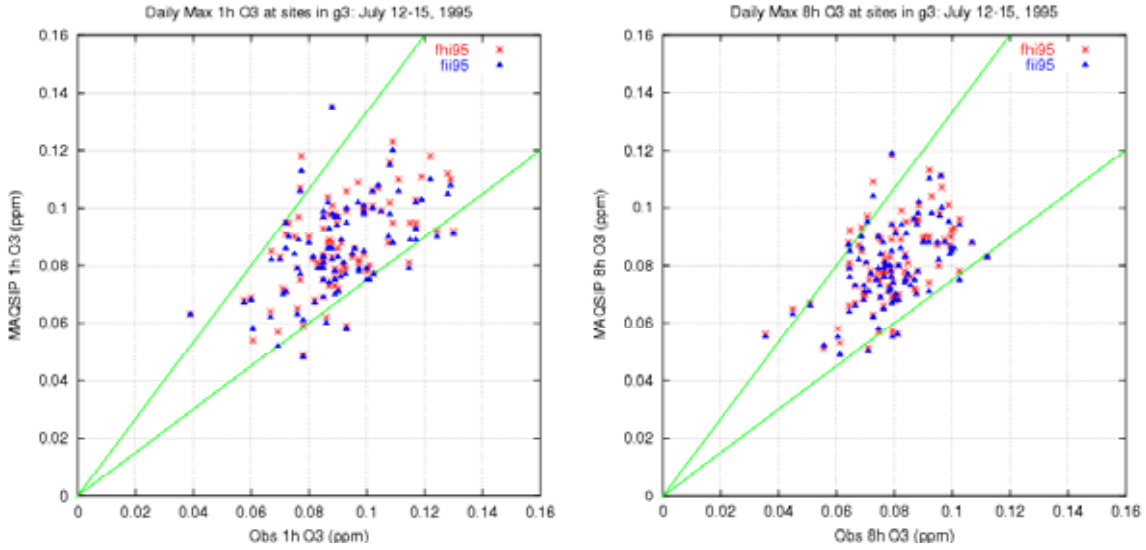


Figure 3. Scatter plot of model predicted versus observed 1-hr and 8-hr max ozone for July 12-15, 1995.

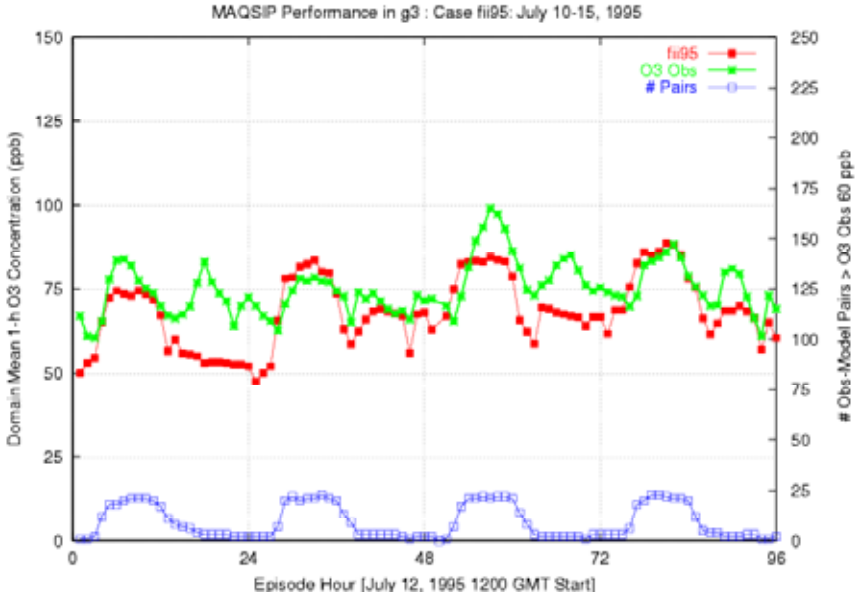


Figure 4. Time series plot of model predicted versus observed mean 1-hr observed ozone concentrations for observed concentrations greater than 60 ppb.

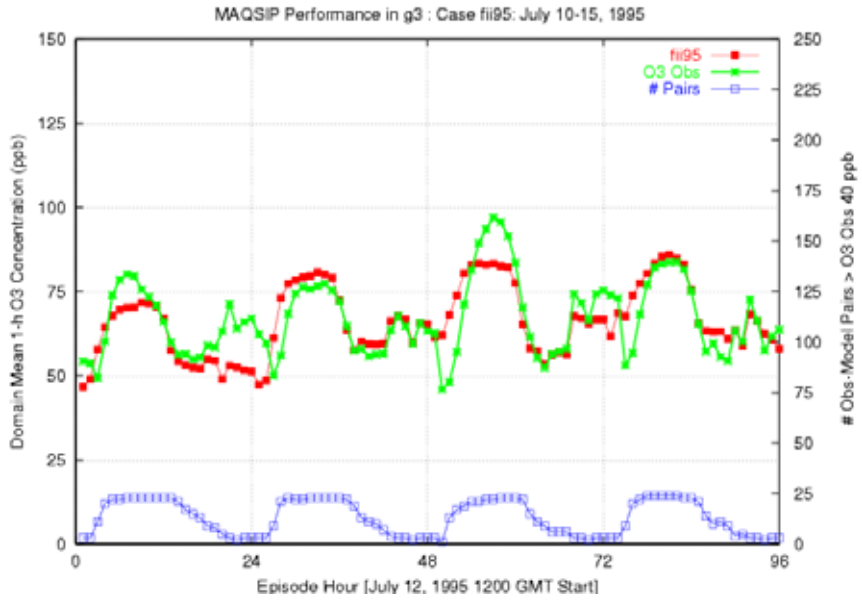


Figure 5. Time series plot of model predicted versus observed mean 1-hr observed ozone concentrations for observed concentrations greater than 40 ppb.

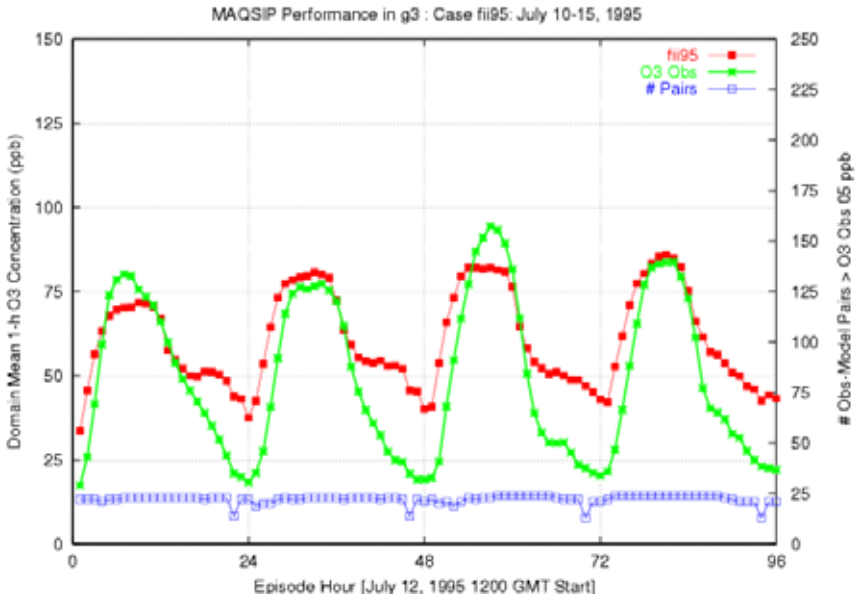


Figure 6. Time series plot of model predicted versus observed mean 1-hr observed ozone concentrations for observed concentrations greater than 05 ppb.

1.1.2 1996 Episodes

Spatial Plots

Below are the domain-wide spatial plots of modeled 1-hr and 8-hr max ozone with the observations overlaid for the first episode in 1996, June 21-24 (Figures 7 and 8) and the second episode June 27-30 (Figures 9 and 10). Again, the model does with the spatial extent of the higher ozone concentrations. The model slightly over predicts ozone in the Charlotte region, but performance in the Triad and other EAC areas appears to be fairly good. Model performance for 8-hr ozone appears to be fairly good as well, with the exception of some over prediction in the Triad and Fayetteville regions.

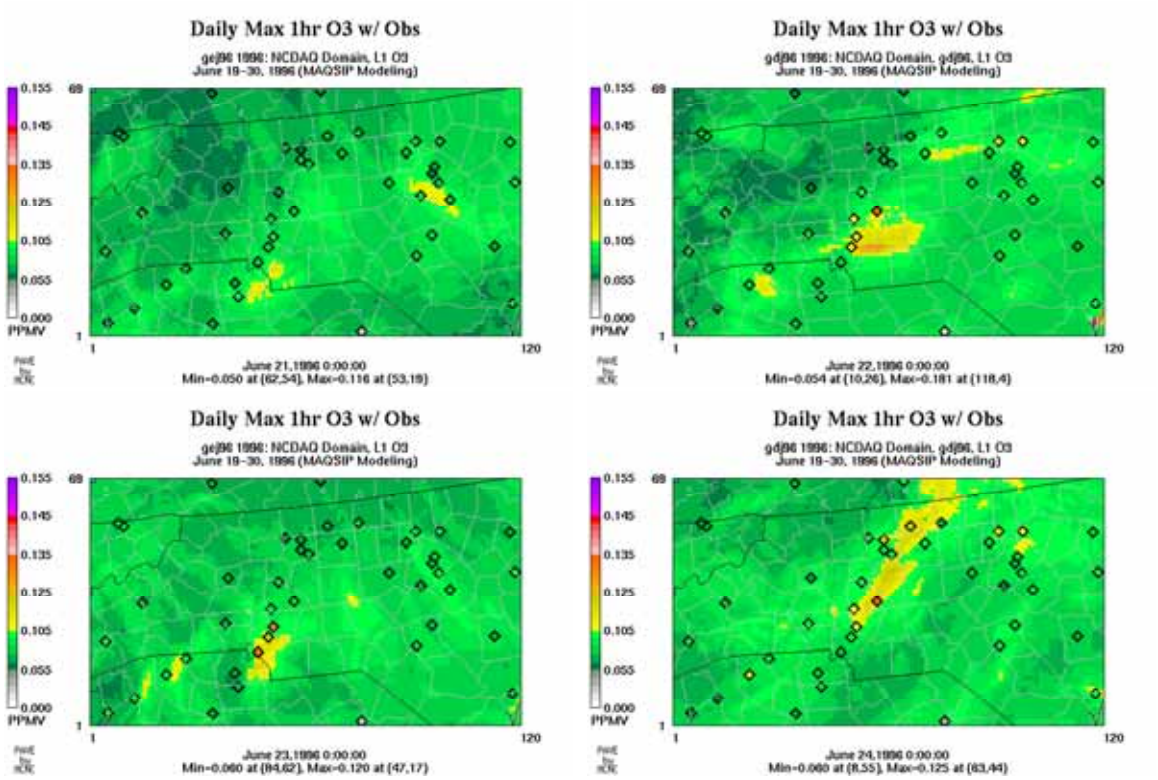


Figure 7. Spatial plots for model predicted and observed peak 1-hr ozone concentrations for June 21-24, 1996.

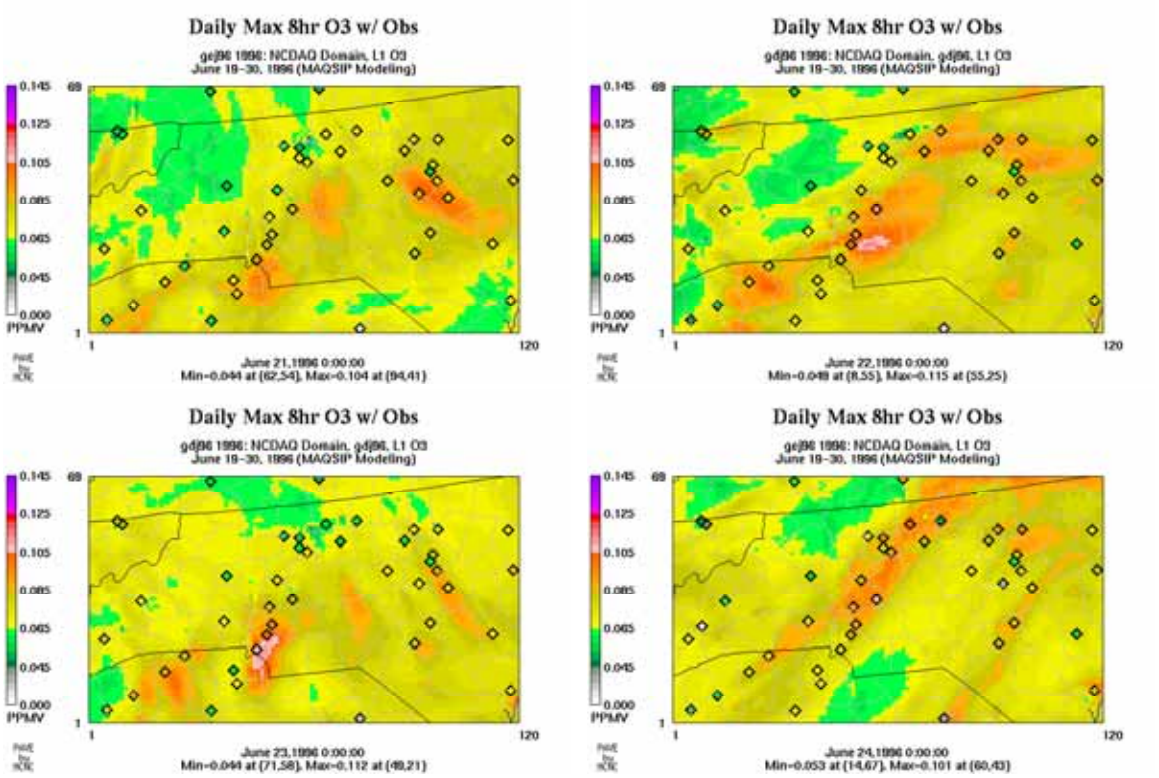


Figure 8. Spatial plots for model predicted and observed peak 8-hr ozone concentrations for June 21-24, 1996.

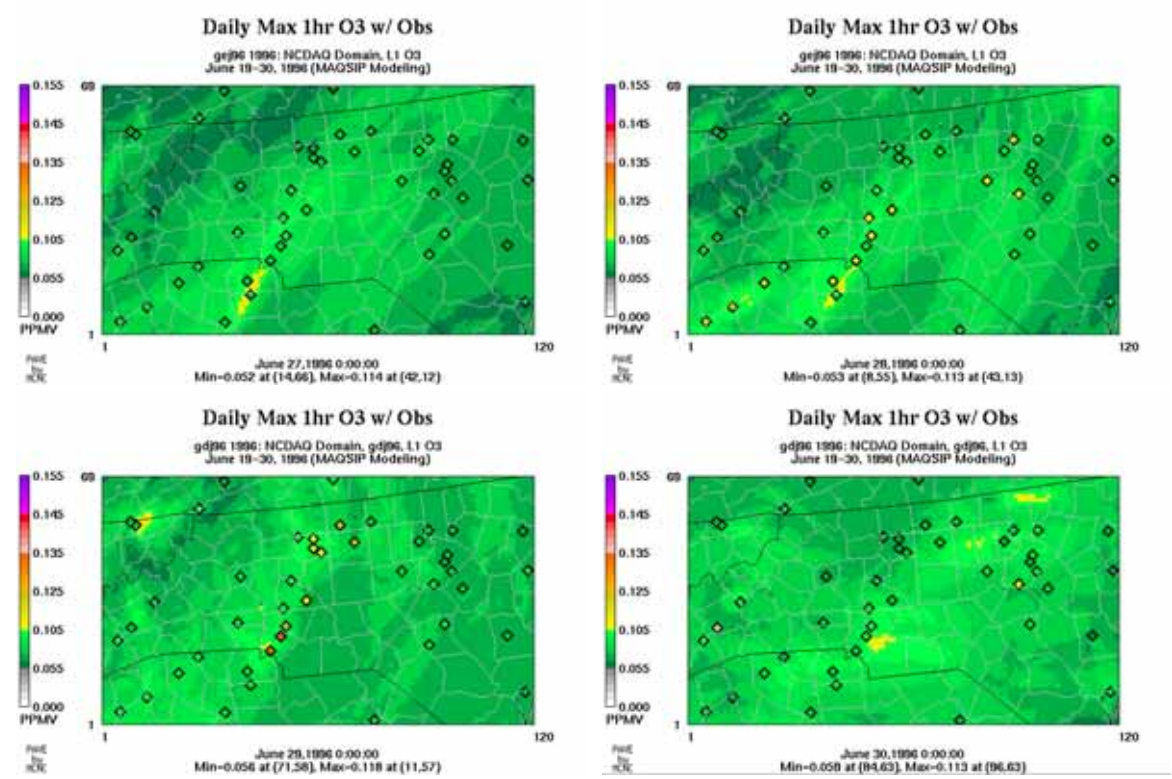


Figure 9. Spatial plots for model predicted and observed peak 1-hr ozone concentrations for June 27-30, 1996.

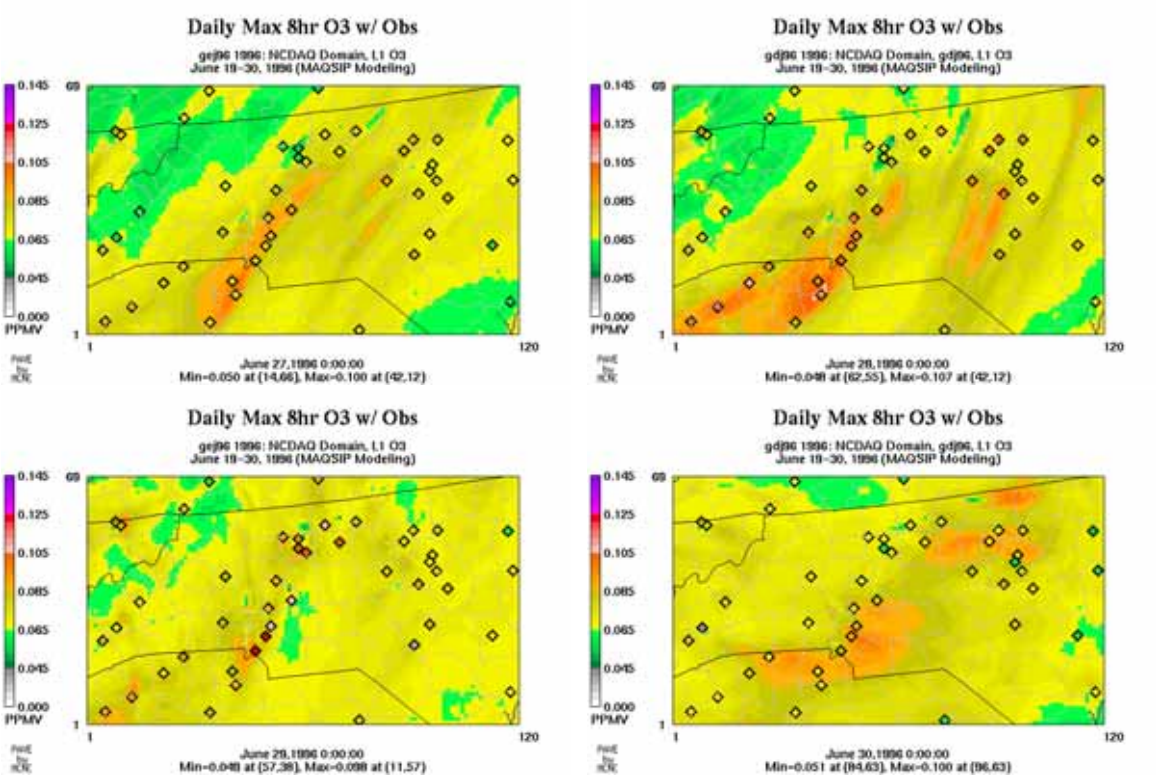


Figure 10. Spatial plots for model predicted and observed peak 8-hr ozone concentrations for June 27-30, 1996.

Scatter Plots

The scatter plots below show that while there are some over predictions, most of the model predicted concentrations are within acceptable limits for performance (Figure 11).

4 km Domain Time Series

The time series plots for the 1996 episode show that throughout the whole domain the overall model performance was good, with the model generally doing a good job capturing the max ozone peaks (Figures 12 through 14). The model tended to perform better at the 40 and 5 ppb thresholds as opposed to the 60 ppb threshold. However, the model did capture the ozone peaks at the 60 ppb threshold fairly well.

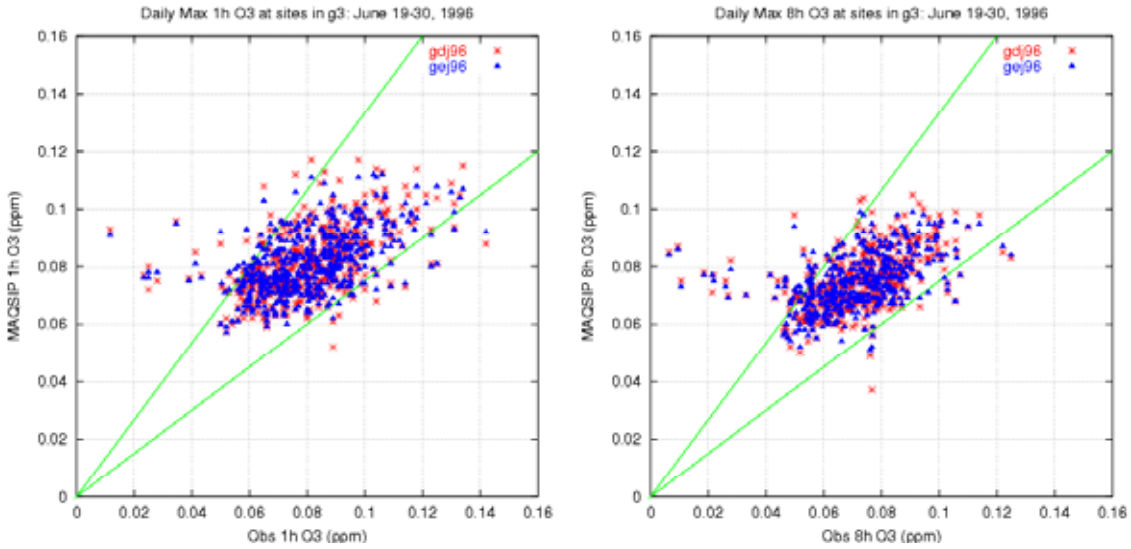


Figure 11. Scatter plot of model predicted versus observed 1-hr and 8-hr max ozone for June 19-30, 1996.

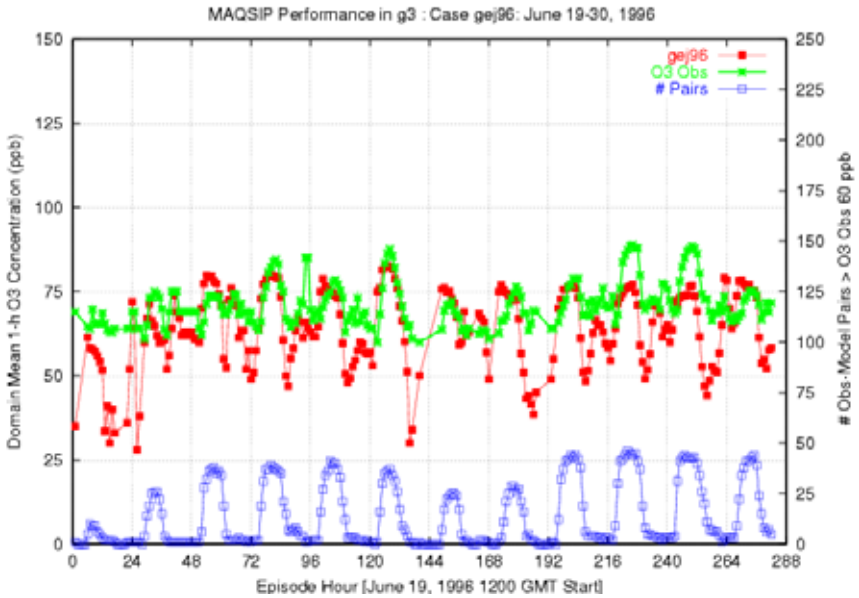


Figure 12. Time series plot of model predicted versus observed mean 1-hr observed ozone concentrations for observed concentrations greater than 60 ppb for June 19-30, 1996.

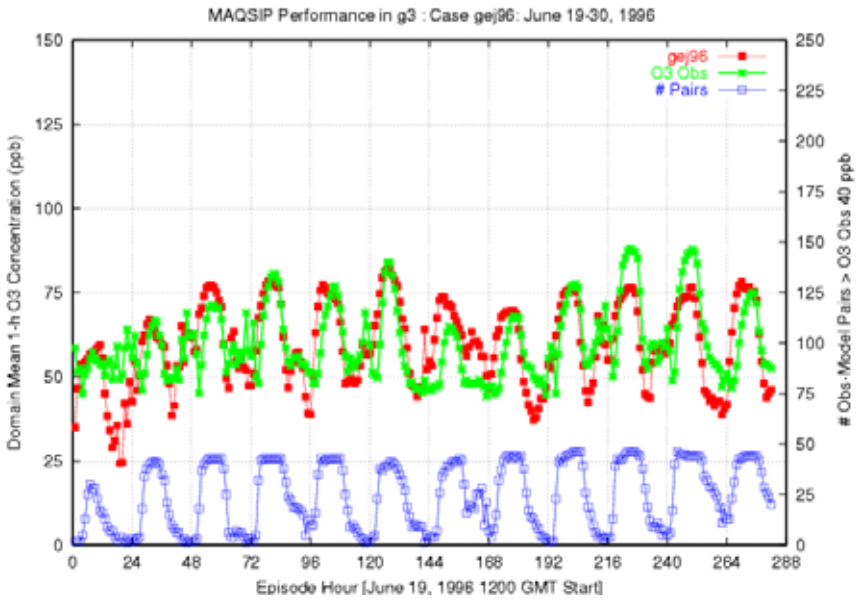


Figure 13. Time series plot of model predicted versus observed mean 1-hr observed ozone concentrations for observed concentrations greater than 40 ppb for June 19-30, 1996.

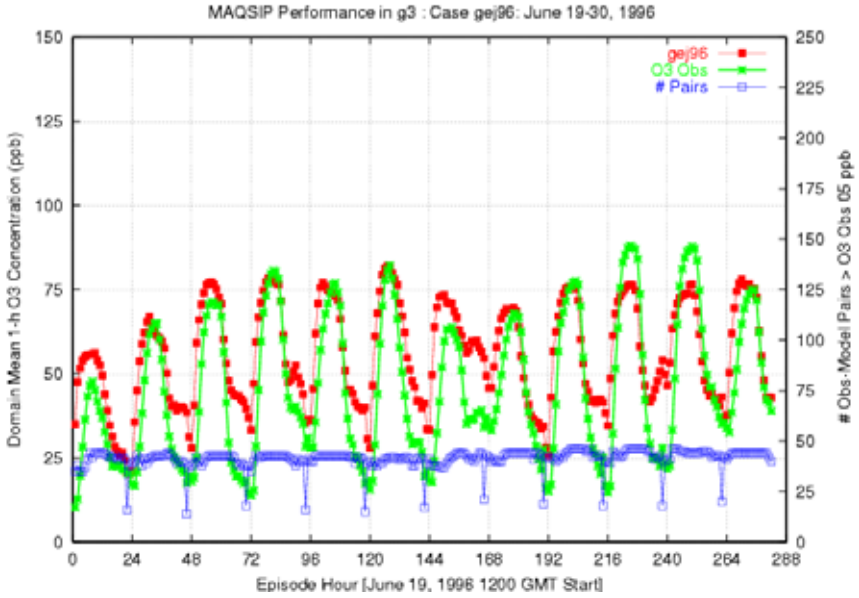


Figure 14. Time series plot of model predicted versus observed mean 1-hr observed ozone concentrations for observed concentrations greater than 5 ppb for June 19-30, 1996.

1.1.3 1997 Episode

Spatial Plots

Spatial model performance at 4 km was good for the 1997 episode, with most of the areas of higher ozone concentrations captured well by the model (Figures 15 and 16). There were very few significant over predictions.

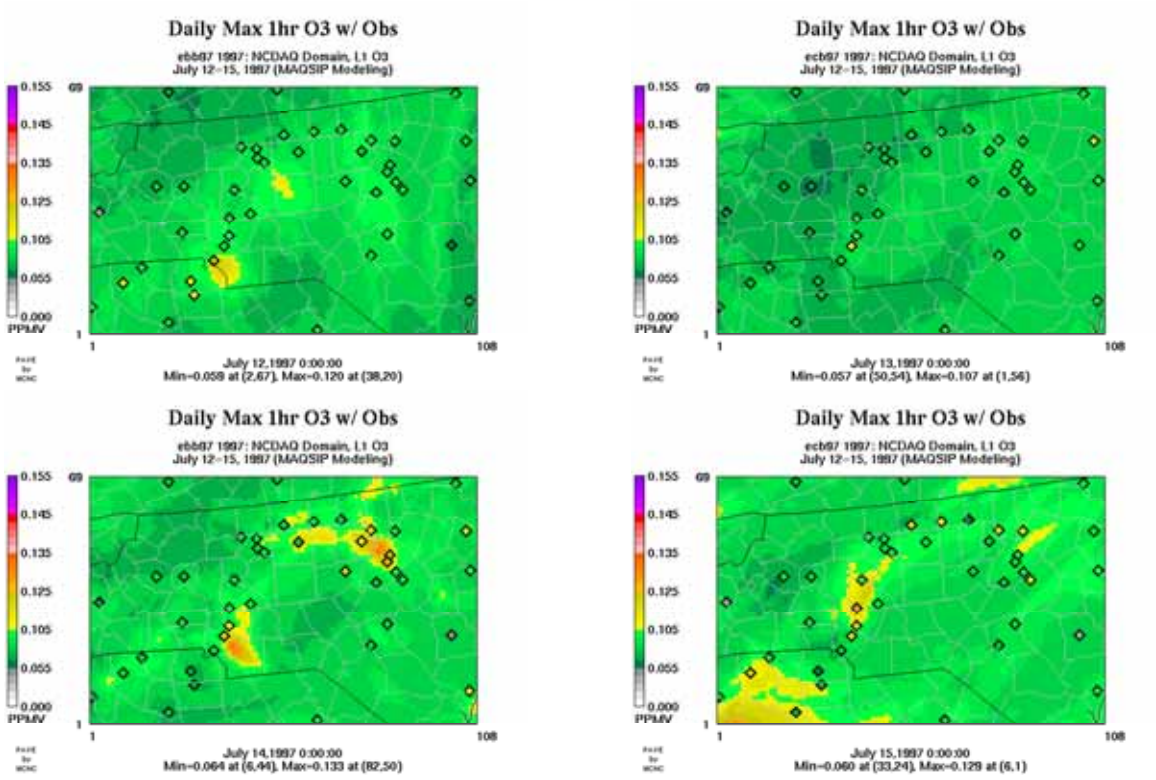


Figure 15. Spatial plots for model predicted and observed peak 1-hr ozone concentrations for July 12-15, 1997.

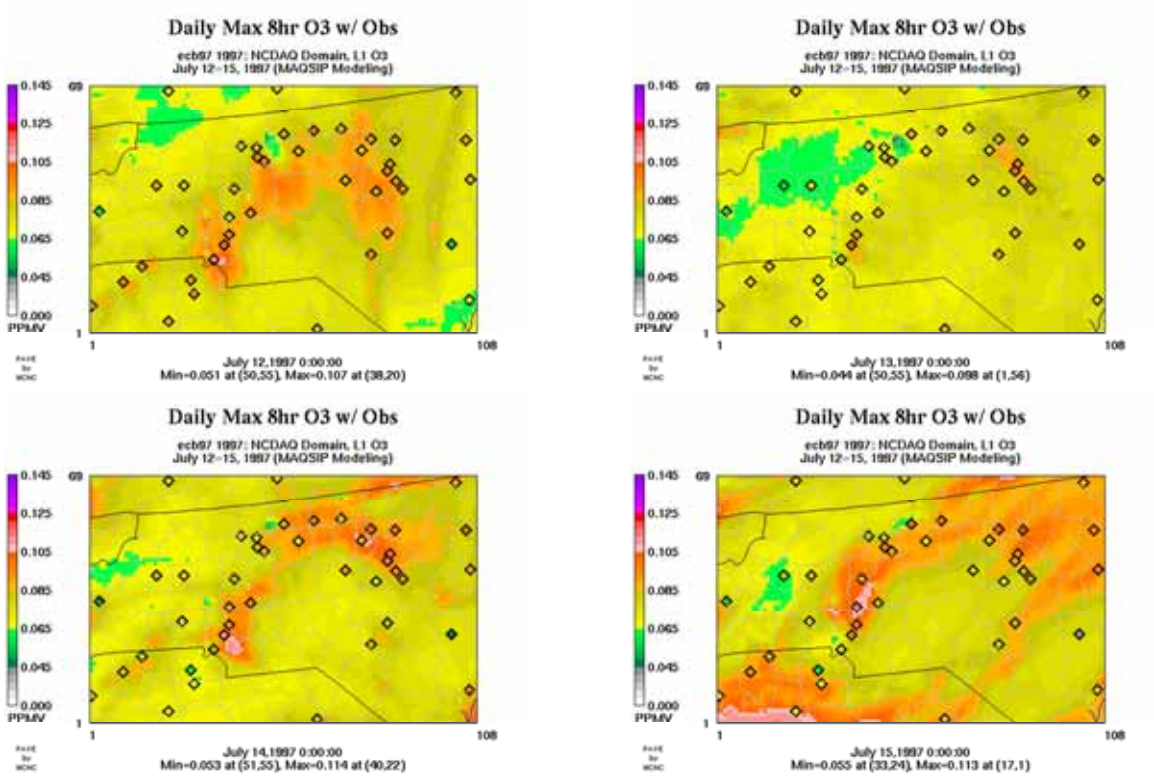


Figure 16. Spatial plots for model predicted and observed peak 8-hr ozone concentrations for July 12-15, 1997.

Scatter Plots

As with the 1996, there were several model over predictions, as well as some less significant under predictions. Overall, the majority of the model forecasts fall within the thresholds for acceptable performance (Figure 17).

4 km Domain Time Series

As with the previous domain wide time series plots, the model did well capturing the peak ozone, with mostly a slight under prediction on some days (Figures 18 through 20). Overall, the model did well capturing the ozone cycle for the 40 and 5 ppb thresholds, while the model tended to under predict ozone during the overnight periods for the 60 ppb threshold.

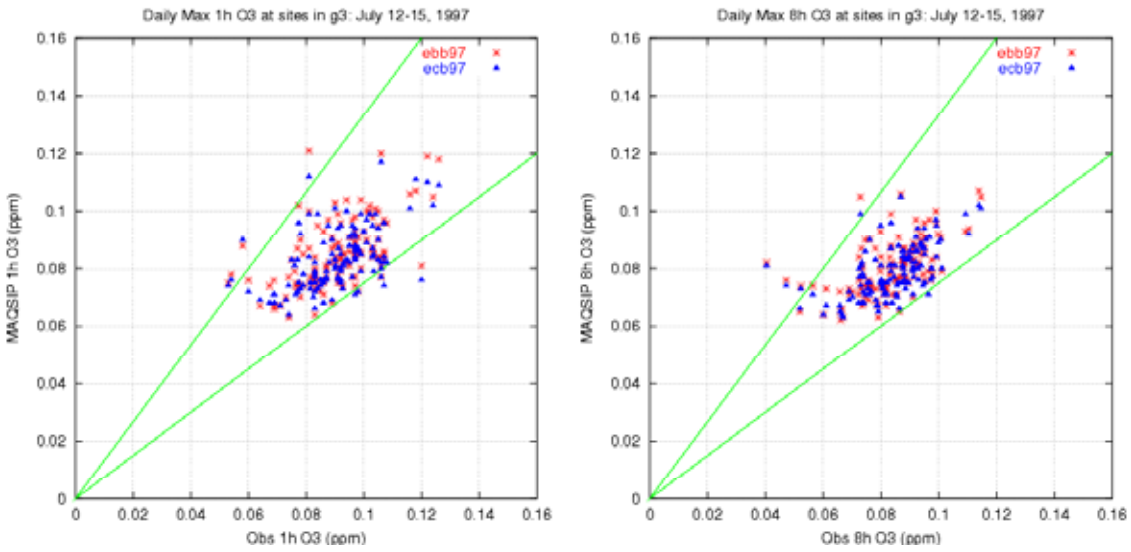


Figure 17. Scatter plot of model predicted versus observed 1-hr and 8-hr max ozone for July 12-15, 1997.

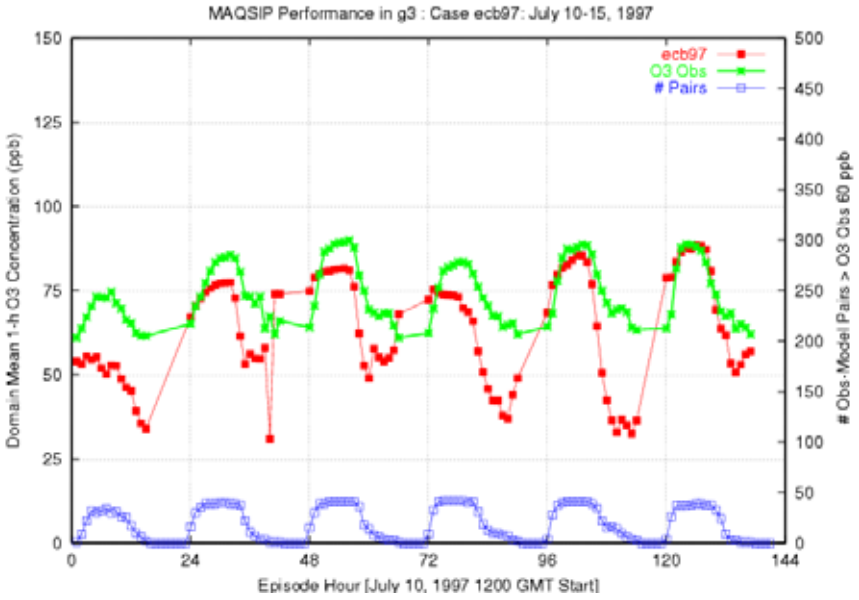


Figure 18. Time series plot of model predicted versus observed mean 1-hr observed ozone concentrations for observed concentrations greater than 60 ppb for July 10-15, 1997.

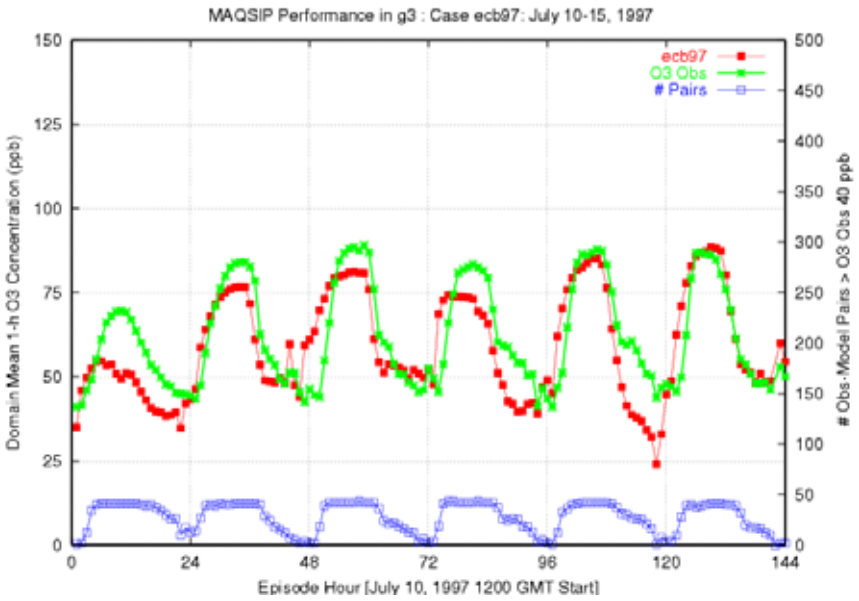


Figure 19. Time series plot of model predicted versus observed mean 1-hr observed ozone concentrations for observed concentrations greater than 40 ppb for July 10-15, 1997.

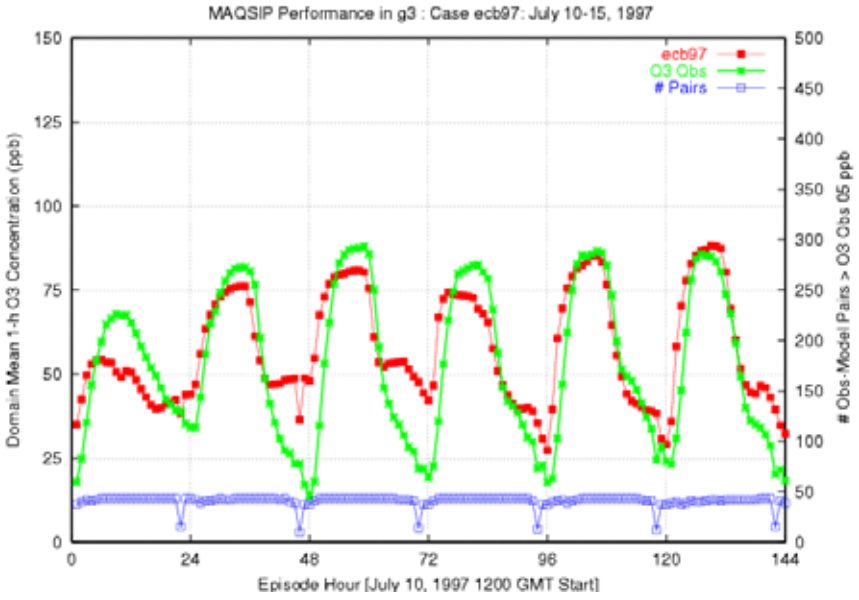


Figure 20. Time series plot of model predicted versus observed mean 1-hr observed ozone concentrations for observed concentrations greater than 5 ppb for July 10-15, 1997.

1.1.4 Domain-Wide Summary

Overall, the model performance for the entire domain throughout all three episodes is good. For the most part, normalized bias and gross error are within the recommended limits for good model performance, especially above 40 ppb. The model seems to do a good job capturing the ozone cycle for all three episodes. There are some instances of under and over predictions, but for the majority of the time the model does well simulating the afternoon ozone peak throughout the whole domain. The scatter plots show that the model did well for the 1995 and 1997 episodes, while having a slight over prediction tendency for the 1996 episode. We feel that the model performance is well within the limits of acceptable performance established in the draft guidance.

1.2 EAC Model Performance Evaluation

Below is the model performance evaluation for each EAC area (Triad, Unifour, Mountain, and Fayetteville). Included are visual (e.g. time series) and statistical measures for each region. These evaluation products include:

1. Time series plots showing how the model's predicted ozone compares to the observed ozone at the monitor within the same grid cell. This is considered the most stringent of the model performance evaluation procedures since it requires the evaluation of the model's ability to predict the observed ozone in the location where it was observed over all hours of the episode.

2. Statistical measures by EAC region and by monitors in those regions. Statistical measures include bias, normalized bias, and gross error. Like the time series, the statistics compare the observed ozone at the monitor to the grid cell where the monitor is located. Tables 3-14 below contain the statistical information. Values in ***red*** are calculated from the 12km modeling domain where the 4km domain did not cover the monitor's location. All other values are from the 4km modeling domain. Blank cells indicate days where no monitored data were available.

1.2.1 Triad EAC Model Performance Evaluation

<u>Time Series Plots</u>

Following are time series plots at 4 km for the Hattie Avenue and Pollirosa monitors located in Forsyth County for the three modeled episodes (Figures 21 through 22). The time series presents the observed values (green x's) and the predicted values (red diamonds). Overall, model performance at the Hattie Avenue monitor is good, although the model tends to under predict the max 8-hr ozone late in the 1995 and 1996 episodes. The model does a fairly good job capturing the diurnal cycle of ozone at Hattie Avenue throughout the three episodes. Model performance is particularly good through the majority of the 1996 episode at Hattie Avenue.

While model performance at the Pollirosa monitor is not as good as for the Hattie Avenue monitor, the model does do a good job capturing the peak ozone at both 1-hr and 8hr. The model does appear to have difficulty capturing the diurnal cycle for ozone, however.

All of the time series plots for the monitors located in the 4 km domain in the Triad EAC region are included in Appendix A, so the model performance for the entire domain can be evaluated.

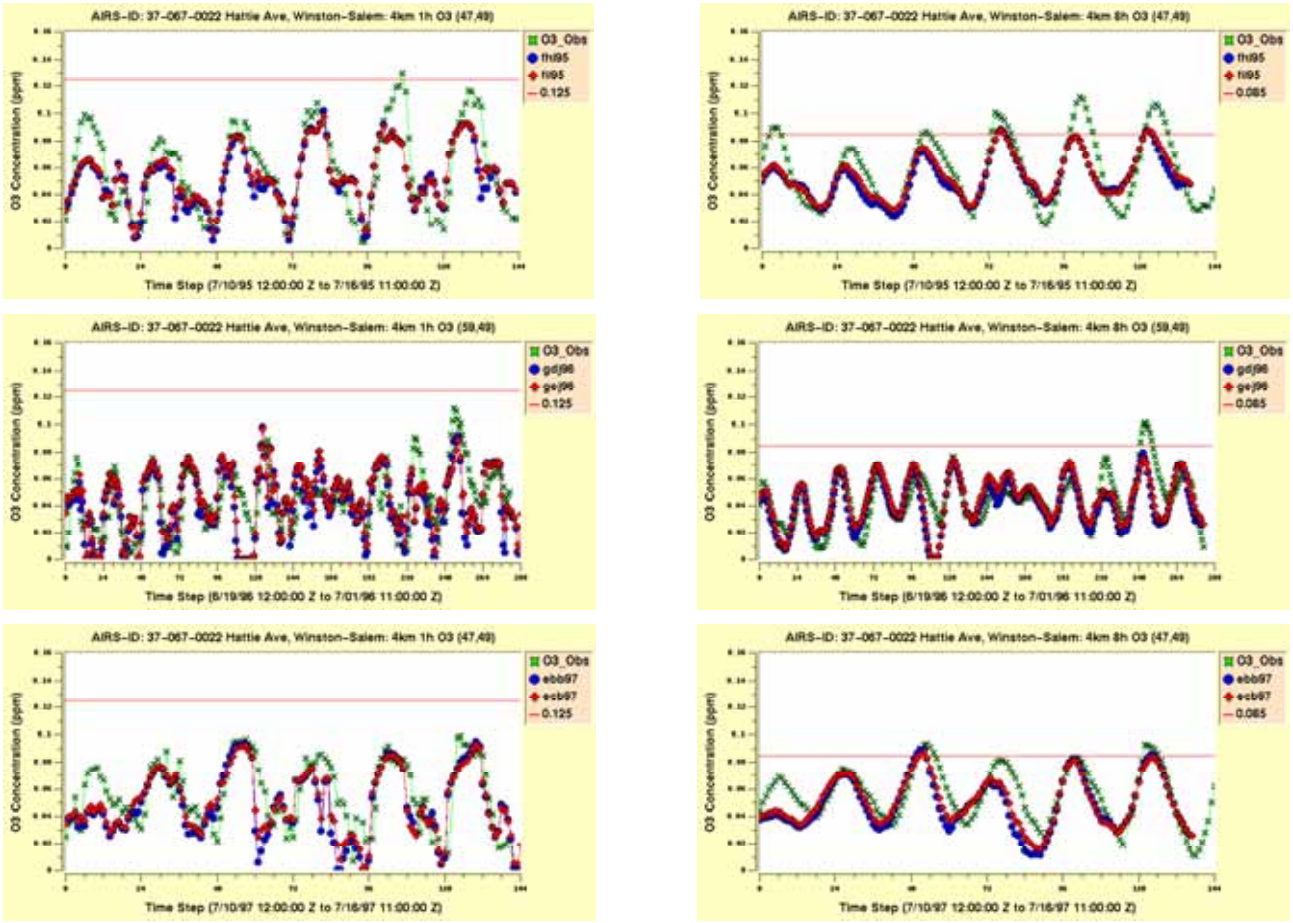


Figure 21. Time series plot of model predicted versus observed 1-hr and 8-hr ozone concentrations for the Hattie Avenue monitor in Forsyth County in the Triad EAC area for the three episodes.

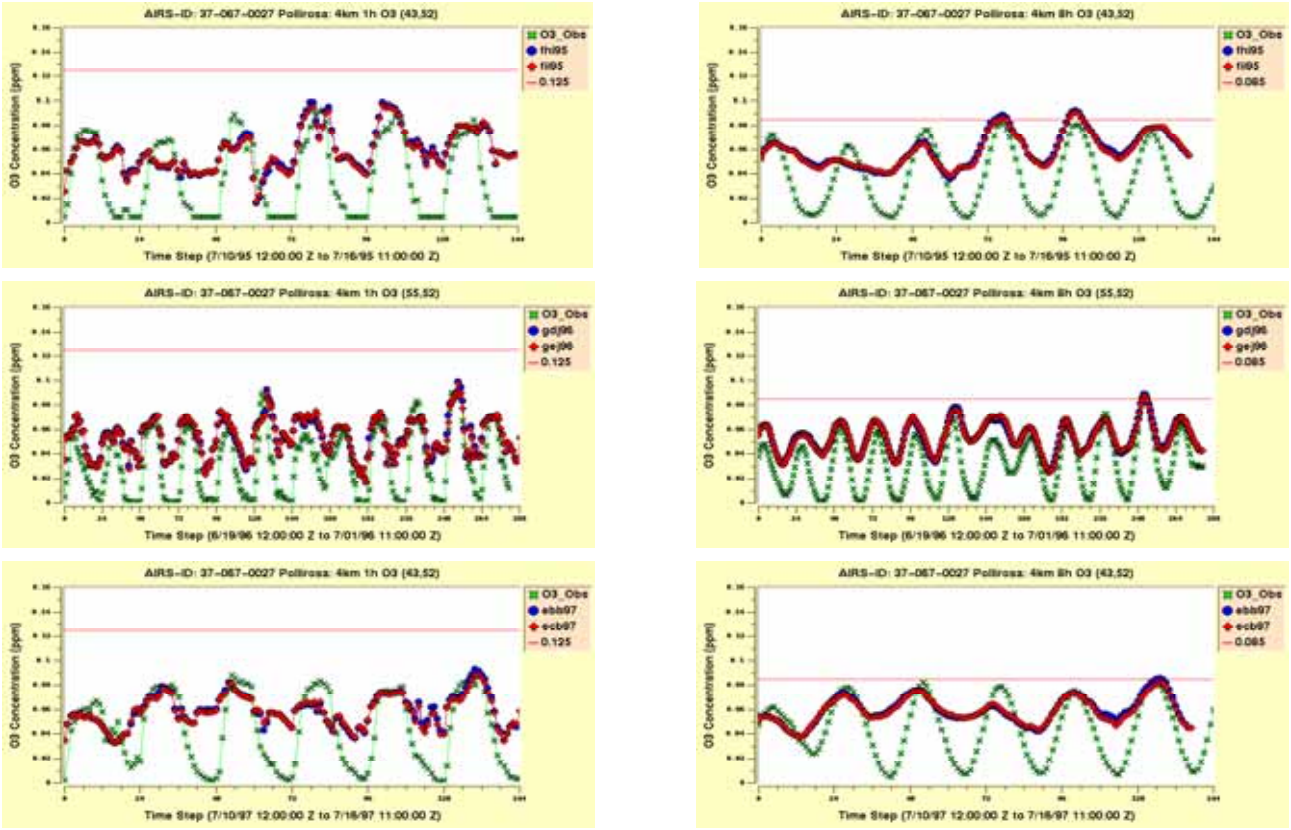


Figure 22. Time series plot of model predicted versus observed 1-hr and 8-hr ozone concentrations for the Pollirosa monitor in Forsyth County in the Triad EAC area for the three episodes.

Area and Monitor Statistics

The following are tables that include the modeled mean at each monitor in the Triad EAC area compared with the observed mean. Each of the episodes modeled are included.

It is recommended that the normalized bias fall with ± 5-15 percent and the gross error not exceed the 30-35 percent range. Table 3 shows that the Triad is well within these ranges for the EAC wide statistics in the 1995 episode. Table 3 does show some performance outside the ranges for specific monitors. In the case of Hattie Avenue, the large negative bias can be attributed to high observed ozone on one of the episode days. It should be noted that performance statistics were not calculated for the Cooleemee, Shiloh and Sophia monitors because they were not in operation during 1995.

Table 4 presents both the 1996 episodes where, again, the EAC wide statistics are with accepted thresholds. Statistics were not calculated for the Sophia monitor because it was not in operation in 1996. Table 5 shows perhaps the best overall performance of the three episodes with a bias of only –4.0 ppb. Again, the Sophia monitor was not in operation in 1997, so no statistics are calculated for this monitor.

Table 3. Triad Area/Monitor Statistics for the 1995 Episode

Monitor	1995 Episode				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Triad EAC	86.0	85.0	1.00	2.52	13.76
Bethany	93.0	73.0	20.00	26.37	26.37
Cherry Grove	85.0	85.0	0.00	0.29	8.45
Hattie Avenue	82.0	101.0	-19.00	-16.92	16.92
Mcleansville	80.0	85.0	-5.00	3.62	12.85
Pollirosa	80.0	78.0	2.00	2.40	10.29
Union	86.0	87.0	-1.00	-0.64	7.66

Table 4. Triad Area/Monitor Statistics for the 1996 Episodes

Monitor	1996 Episode 1				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Triad EAC	75.0	69.0	6.00	9.73	12.07
Bethany	72.0	74.0	-2.00	-2.44	6.53
Cherry Grove	79.0	68.0	11.00	22.76	23.46
Cooleemee	77.0	74.0	3.00	4.05	6.58
Hattie Avenue	70.0	67.0	3.00	5.20	6.51
Mcleansville	81.0	72.0	9.00	14.02	14.02
Pollirosa	69.0	61.0	8.00	13.86	13.86
Shiloh	73.0	67.0	6.00	11.76	16.97
Union	78.0	72.0	6.00	8.62	8.62
	1996 Episode 2				
Triad EAC	72.0	79.0	-7.00	0.77	13.64
Bethany	73.0	87.0	-14.00	-14.79	14.79
Cherry Grove	74.0	78.0	-4.00	-3.89	13.67
Cooleemee	77.0	82.0	-5.00	-5.27	11.33
Hattie Avenue	67.0	77.0	-10.00	16.47	20.08
Mcleansville	76.0	80.0	-4.00	7.49	20.21
Pollirosa	73.0	72.0	1.00	-1.24	5.47
Shiloh	64.0	75.0	-11.00	15.96	13.04
Union	77.0	85.0	-8.00	-8.55	10.52

Table 5. Triad Area/Monitor Statistics for the 1996 Episode

Monitor	1997 Episode				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Triad EAC	80.0	84.0	-4.00	-4.03	11.71
Bethany	77.0	88.0	-11.00	-11.78	12.94
Cherry Grove	82.0	95.0	-13.00	-14.00	14.00
Cooleemee	80.0	85.0	-5.00	-5.25	13.29
Hattie Avenue	79.0	87.0	-8.00	-9.22	9.22
Mcleansville	87.0	74.0	13.00	18.99	22.84
Pollirosa	73.0	79.0	-6.00	-8.45	8.45
Shiloh	78.0	77.0	1.00	0.82	7.29
Union	84.0	86.0	-2.00	-3.33	5.61

1.2.2 Unifour EAC Model Performance Evaluation

Time Series Plots

Figure 23 is the time series plot at the Lenoir monitor in Caldwell County in the Unifour EAC area. Note that for the 1996 episode no 4 km time series was available, so the 12 km time series was used instead (without observations). The model has some difficulty simulating the full extent of the ozone cycle throughout the period. The model tends to under predict the peak ozone early in the 1995 period, but does a better job capturing the peaks later in the episode. For the 1997 episode, the model also does not capture the full extent of the peak ozone on several days, but overall performance was good.

Area and Monitor Statistics

Tables 6 through 8 present the area statistics for the Unifour EAC. In Table 6, there are no data for the Taylorsville monitor because there were no observations made during the period. Similarly, there were no observations for the Lenoir monitor during the 1996 episode (Table 7). Overall, there were no major discrepancies between the modeled and observed data.

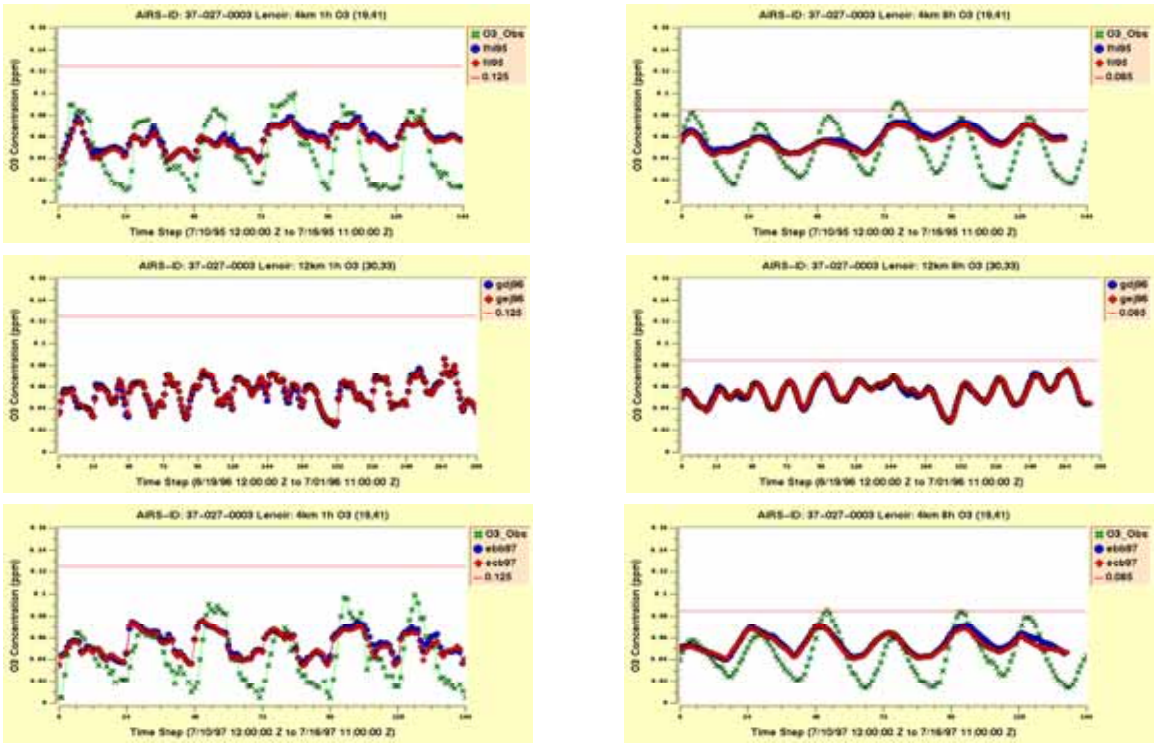


Figure 23. Time series plot of model predicted versus observed 1-hr and 8-hr ozone concentrations for the Lenoir monitor in Caldwell County in the Unifour EAC area for the three episodes.

Table 6. Unifour Area/Monitor Statistics for the 1995 Episode

Monitor	1995 Episode				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Unifour EAC	66.0	81.0	-15.00	-18.74	18.74
Lenoir	66.0	81.0	-15.00	-18.74	18.74
Taylorsville					

Table 7. Unifour Area/Monitor Statistics for the 1996 Episodes

Monitor	1996 Episode 1				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Unifour EAC	67.0	56.0	11.00	20.12	20.12
Lenoir					
Taylorsville	67.0	56.0	11.00	20.12	20.12
1996 Episode 2					
Unifour EAC	69.0	74.0	-5.00	7.17	7.11
Lenoir					
Taylorsville	69.0	74.0	-5.00	7.17	7.11

Table 8. Unifour Area/Monitor Statistics for the 1997 Episode

Monitor	1997 Episode				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Unifour EAC	68.0	76.0	-8.00	-9.78	11.45
Lenoir	66.0	77.0	-11.00	12.28	15.61
Taylorsville	70.0	76.0	-6.00	-7.29	7.29

1.2.3 Mountain EAC Model Performance Evaluation

Time Series Plots

Figure 24 shows the time series plot for the Bent Creek monitor in Buncombe County in the Mountain EAC area for all three episodes, and represents a valley location. Note that the Bent Creek monitor was not in the 4 km domain for the 1995 episode, so the 12 km data is used instead. The model has considerable difficulty simulating the diurnal ozone cycle in the mountains and valleys. However, the model still does a fair job capturing the peak ozone concentrations at Bent Creek. The model does perform fairly well late in the 1996 episode.

Figure 25 shows the time series plot for the Frying Pan monitor in Haywood County in the Mountain EAC area for all three episodes, and represents a high elevation (peak) location in the mountains. The diurnal behavior of ozone in high elevation locations is much different from other locations. While the model has some difficulty trying to capture the ozone cycle at Frying Pan, the overall performance of the model at the location is acceptable.

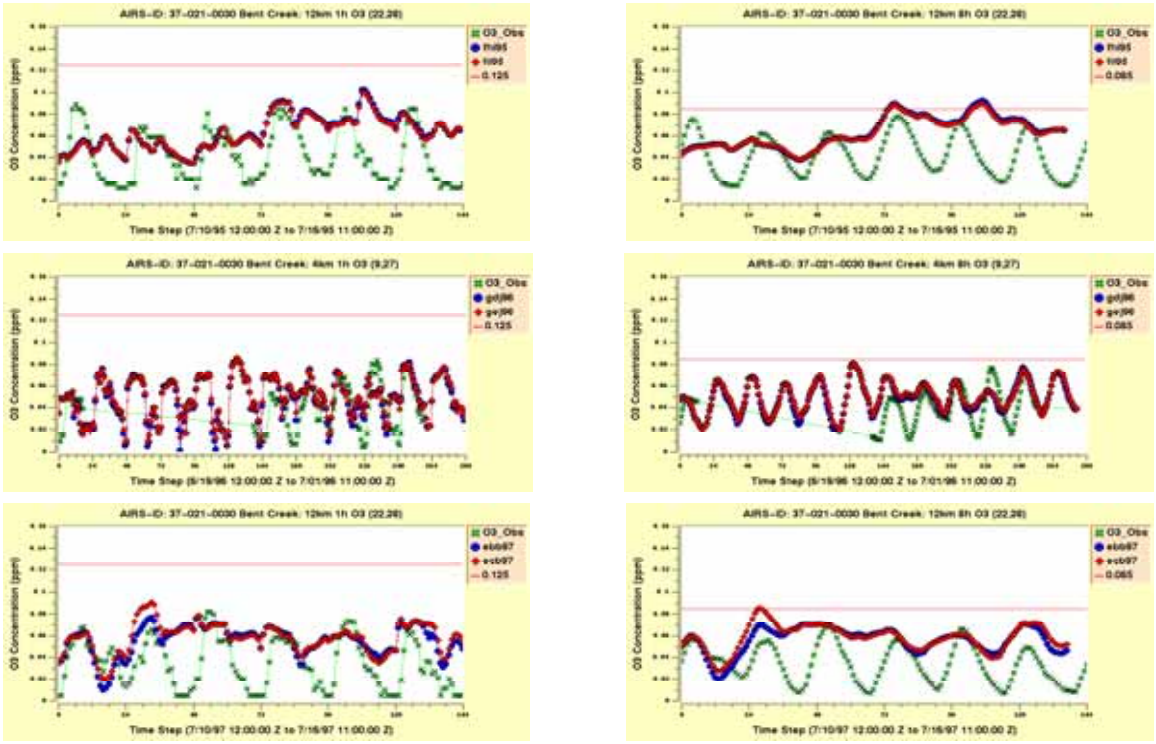


Figure 24. Time series plot of model predicted versus observed 1-hr and 8-hr ozone concentrations for the Bent Creek monitor in Caldwell County in the Mountain EAC area for the three episodes.

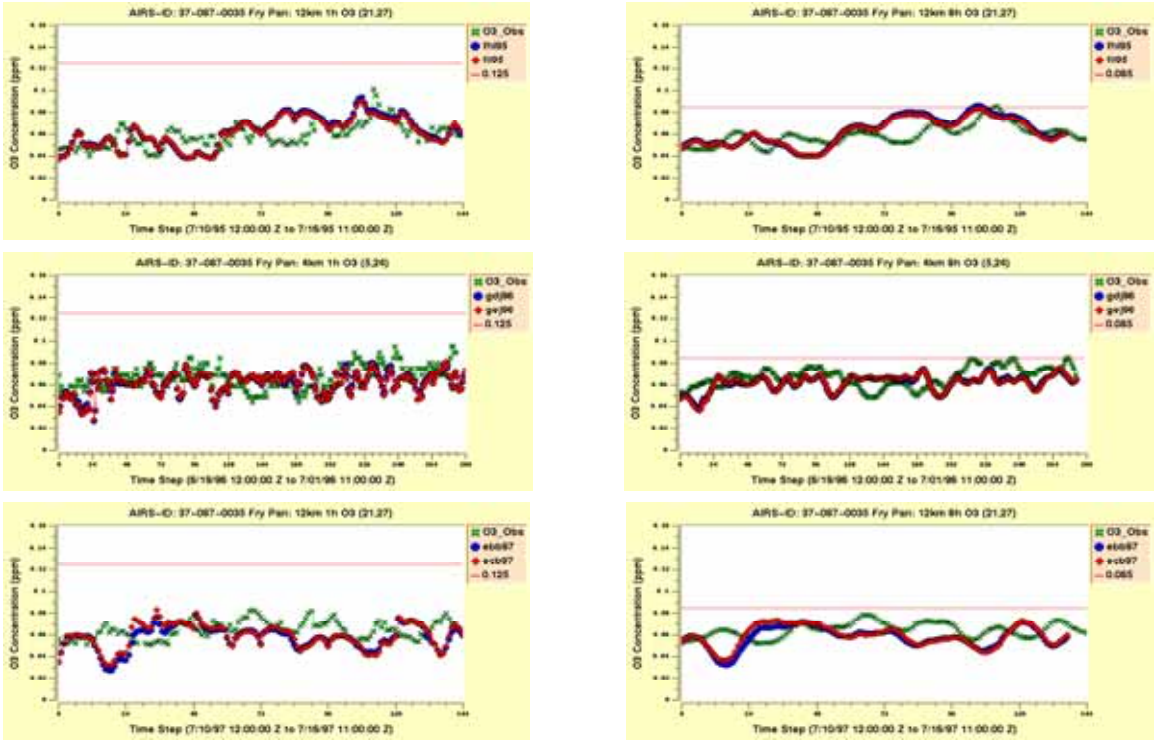


Figure 25. Time series plot of model predicted versus observed 1-hr and 8-hr ozone concentrations for the Frying Pan monitor in Haywood County in the Mountain EAC area for the three episodes.

Area and Monitor Statistics

Somewhat surprisingly, because of the complex terrain, the statistics performed on the Mountain EAC were mostly within the accepted ranges. The main outlier is in Table 11 where under-prediction plagued the model at the Purchase Knob monitor. The statistics were not calculated for the Waynesville monitoring site for any of the episodes since it was not in operation during this period.

Table 9. Mountain Area/Monitor Statistics for the 1995 Episode

Monitor	1995 Episode				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Mountain EAC	73.0	71.0	2.00	2.59	9.07
Bent Creek	77.0	70.0	7.00	8.99	12.96
Frying Pan	75.0	73.0	2.00	2.70	7.04
Purchase Knob	66.0	69.0	-3.0	-3.92	7.19

Table 10. Mountain Area/Monitor Statistics for the 1996 Episodes

Monitor	1996 Episode 1				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Mountain EAC	67.0	69.0	-2.00	-1.41	10.03
Bent Creek					
Frying Pan	67.0	73.0	-6.00	-7.63	7.63
Purchase Knob	67.0	65.0	2.00	4.81	12.44
1996 Episode 2					
Mountain EAC	69.0	78.0	-9.00	2.25	14.57
Bent Creek	64.0	70.0	-6.00	-7.82	10.60
Frying Pan	84.0	70.0	-14.00	16.34	16.34
Purchase Knob	71.0	79.0	-8.00	-7.81	15.78

Table 11. Mountain Area/Monitor Statistics for the 1997 Episode

Monitor	1997 Episode				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Mountain EAC	65.0	75.0	-10.00	-8.69	19.03
Bent Creek	66.0	60.0	6.00	13.63	17.41
Frying Pan	66.0	75.0	-9.00	-11.64	11.64
Purchase Knob	64.0	89.0	-25.00	-28.05	28.05

1.2.4 Fayetteville EAC Model Performance Evaluation

Time Series Plots

Figure 26 shows the time series plot for the Wade monitor in Cumberland County in the Fayetteville EAC area for all three episodes. While the model has some difficulty capturing the ozone cycle early in the 1995 episode, overall model performance for the three episodes is good. The model does very well simulating the peak ozone during the majority of the days in each episode.

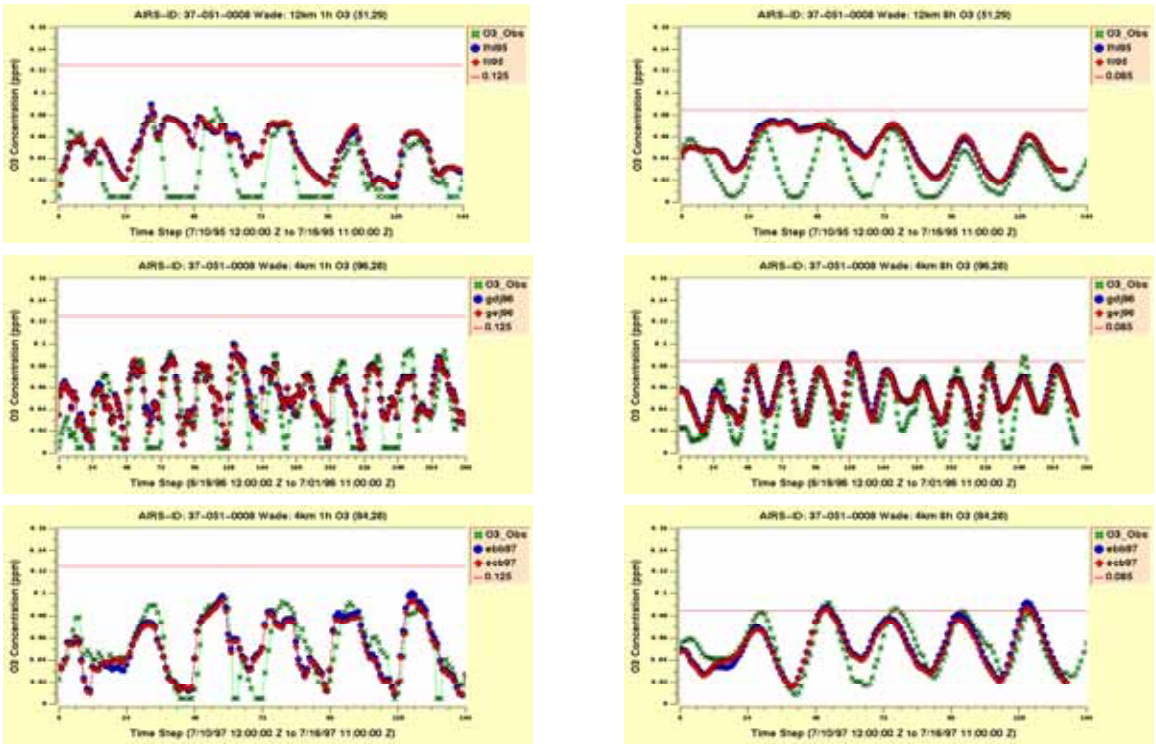


Figure 26. Time series plot of model predicted versus observed 1-hr and 8-hr ozone concentrations for the Wade monitor in Cumberland County in the Fayetteville EAC area for the three episodes.

Area and Monitor Statistics

Tables 12 through 14 again display the statistics for each monitor in the Fayetteville EAC. All the statistics fall within acceptable ranges with the exception of the Golfview monitor in the second episode in 1996. This large positive bias can be attributed to an abnormally low reading at the monitor on June 29, 1996 of the episode.

Table 12. Fayetteville Area/Monitor Statistics for the 1995 Episode

Monitor	1995 Episode				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Fayetteville EAC	64.0	56.0	8.00	17.23	18.24
Wade	66.0	60.0	6.00	12.57	14.60
Golfview	62.0	52.0	10.00	21.89	21.89

Table 13. Fayetteville Area/Monitor Statistics for the 1996 Episodes

Monitor	1996 Episode 1				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Fayetteville EAC	79.0	80.0	-1.00	-0.31	6.14
Wade	81.0	78.0	3.00	3.65	5.48
Golfview	78.0	81.0	-3.00	-4.27	6.80
	1996 Episode 2				
Fayetteville EAC	73.0	78.0	-5.00	-0.31	22.90
Wade	72.0	81.0	-9.00	-11.64	9.05
Golfview	75.0	74.0	1.00	14.79	37.92

Table 14. Fayetteville Area/Monitor Statistics for the 1997 Episode

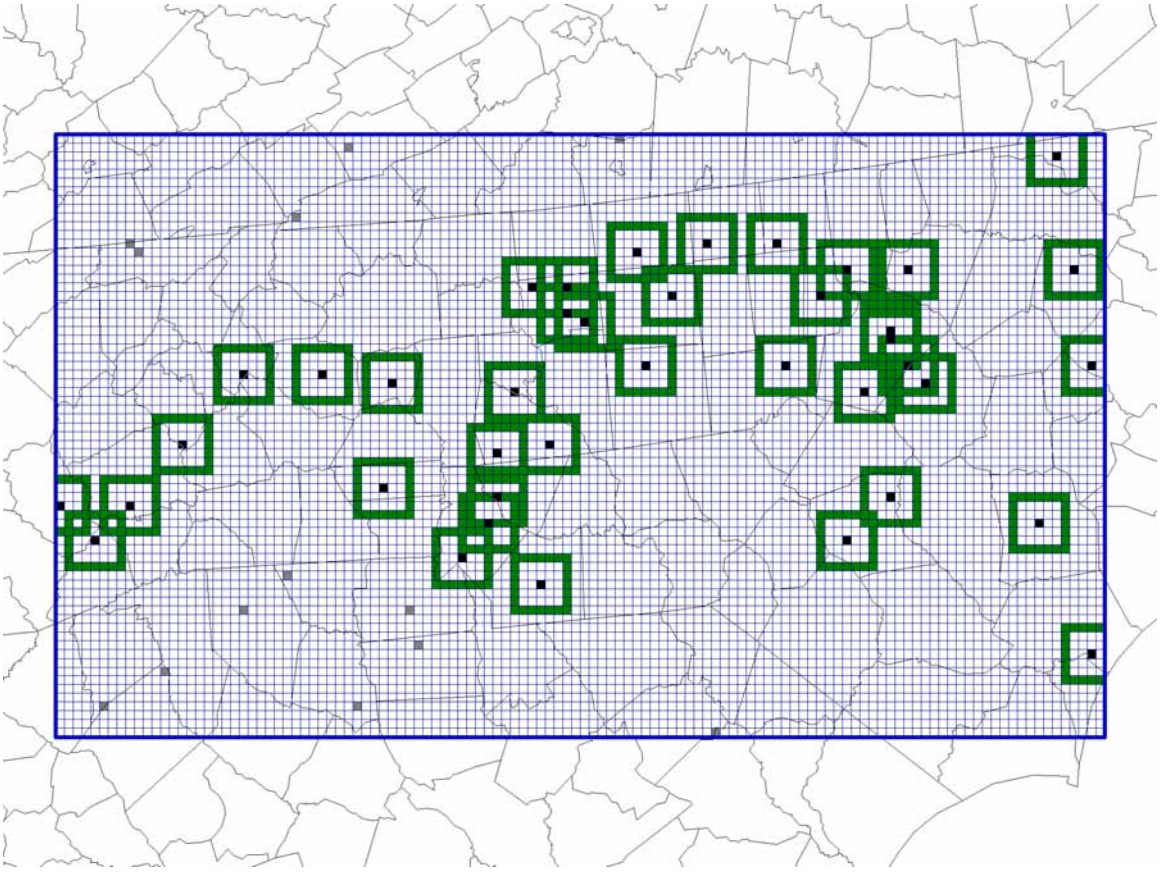
Monitor	1997Episode				
	Modeled Mean (ppb)	**Observed Mean (ppb)**	**Bias (ppb)**	**Norm. Bias (%)**	**Norm. Gross Error (%)**
Fayetteville EAC	79.0	85.0	-6.00	-6.75	9.59
Wade	81.0	85.0	-4.00	-5.35	9.05
Golfview	78.0	85.0	-7.00	-8.15	10.12

2 Screening Test

The modeled attainment test does not address future air quality at locations where there is no nearby ozone monitor. If the air quality model *consistently* predicts 8-hour daily maximum ozone concentrations at a particular, unmonitored location, which are substantially higher than any predicted near a monitoring site, a State should perform an additional screening test. The screening test is to multiply the area wide monitored design value (i.e., the highest of the site-specific monitored design values) times the relative reduction factor(s) predicted at the suspect receptor location(s). If the resulting estimated future design value(s) is $\leq$ 84 ppb, the screening test is passed.

According to U.S. EPA's Draft Guidance On The Use Of Models And Other Analyses In Attainment Demonstrations For The 8-Hour Ozone NAAQS ("*Draft 8-hour Ozone Guidance*"), "an additional review is necessary, particularly in nonattainment areas where the ozone monitoring network just meets or minimally exceeds the size of the network required to report data to AIRS." The North Carolina Division of Air Quality (NCDAQ), along with Local and Tribal Programs, operates a network of 47 ozone monitors. Thirty of these monitors were established as State and Local Air Monitoring Stations (SLAMS). These SLAMS monitors were selected based on specific monitoring objectives (background concentration, area of highest concentration, high population, source impact, transport, and rural impact) as required by EPA and siting scales (micro, middle, neighborhood, urban, and regional) established by EPA. Eight of these monitors were further designated as National Air Monitoring Stations (NAMS) by the EPA and have the primary objective to provide ozone data from areas of expected highest concentration and population exposure and are used to evaluate trends in national air quality. The remaining 17 monitors are Special Purpose Monitors that were established by NCDAQ to evaluate models, study ozone formation and transport, and obtain a better understanding of ozone in North Carolina. NCDAQ believes that the density of its' monitoring network relieves the necessity of applying the screening test. With approximately one monitor per 2900 km^2, this is one of the densest statewide ozone monitoring networks in the nation. A map of each ozone monitor and its "nearby" array in the NCDAQ 4-km modeling domain (1996 episode) is provided in Figure 27. "Nearby" is defined by a 7x7 array of grid cells with the monitor located in the center cell. This is consistent with EPA's definition of "nearby" on page 37 of the *Draft 8-hour Ozone Guidance*. Note the spatial coverage of the arrays in the NCDAQ modeling domain.

Figure 27. NCDAQ 4-km modeling domain with ozone monitoring arrays



Despite the density of North Carolina's ozone monitoring network, NCDAQ has done an analysis to identify any area in the modeling domain where absolute predicted 8-hour daily maximum ozone concentrations are *consistently* greater than any predicted in the vicinity of a monitoring site. For this analysis, NCDAQ used the EPA definition of "*consistently*" as stated on page 49 of the *Draft 8-hour Ozone Guidance*:

> -predicted 8-hour daily maxima at the location in question is > 5% higher than any near a monitored location on 50% or more of the modeled day

Special graphical plots were generated so one could visually inspect grid cells that are not covered by the arrays "near" monitors as defined in the modeled attainment test. The color progression on the spatial plot was set such that each color, as you go up the scale, is 5% higher than the previous color. Figures 28 through 42 provide the daily absolute predicted 8-hour daily maximum ozone concentrations using the color progression designed for screening. **One can deduce from visual inspection of the plots provided, that no grid cells are "consistently" higher than any near a monitored location greater than 50% of the time.**

Figure 28. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for July 13, 1995.

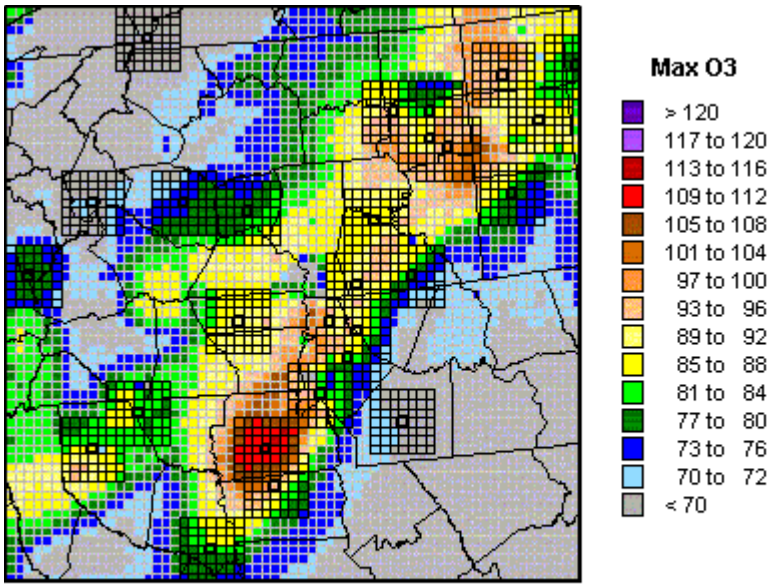


Figure 29. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for July 14, 1995.

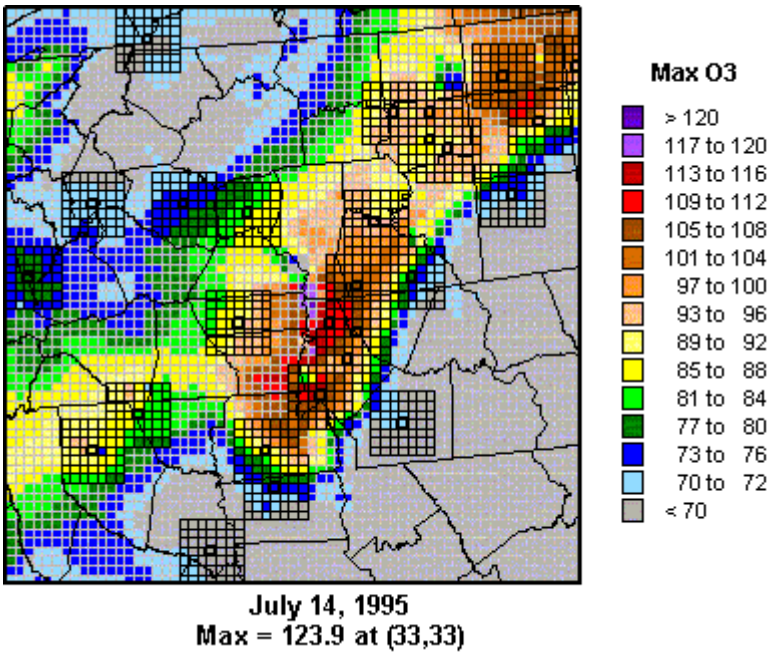


Figure 30. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for July 15, 1995.

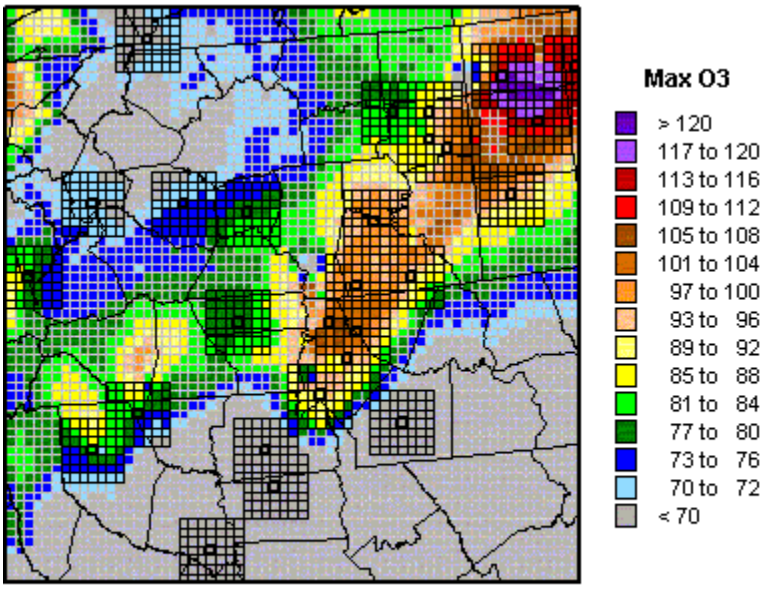


Figure 31. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for June 21, 1996.

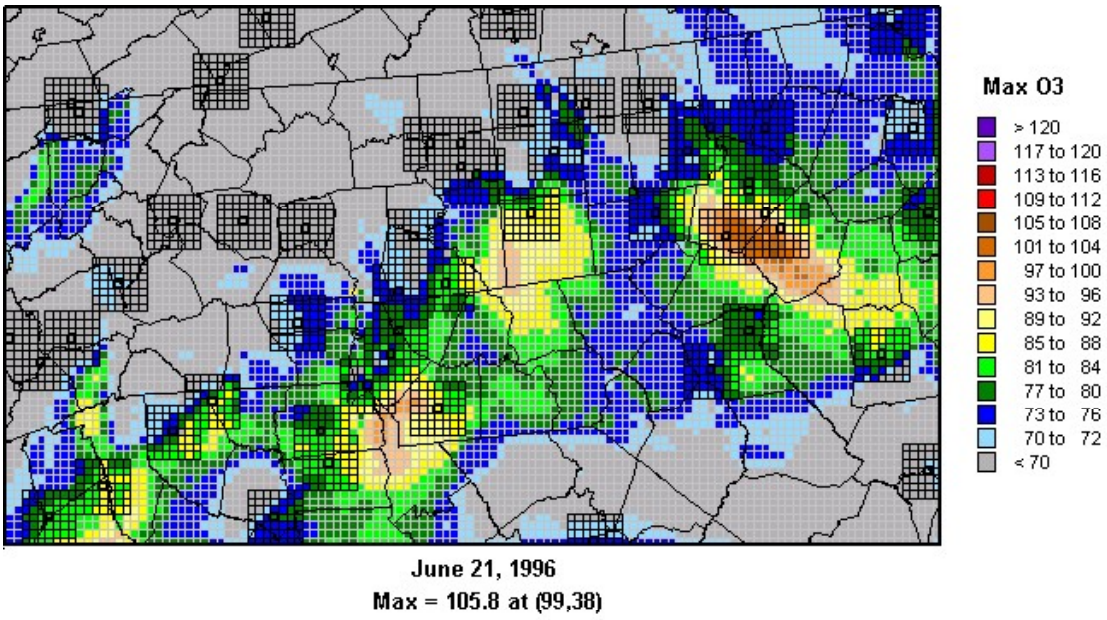


Figure 32. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for June 22, 1996.

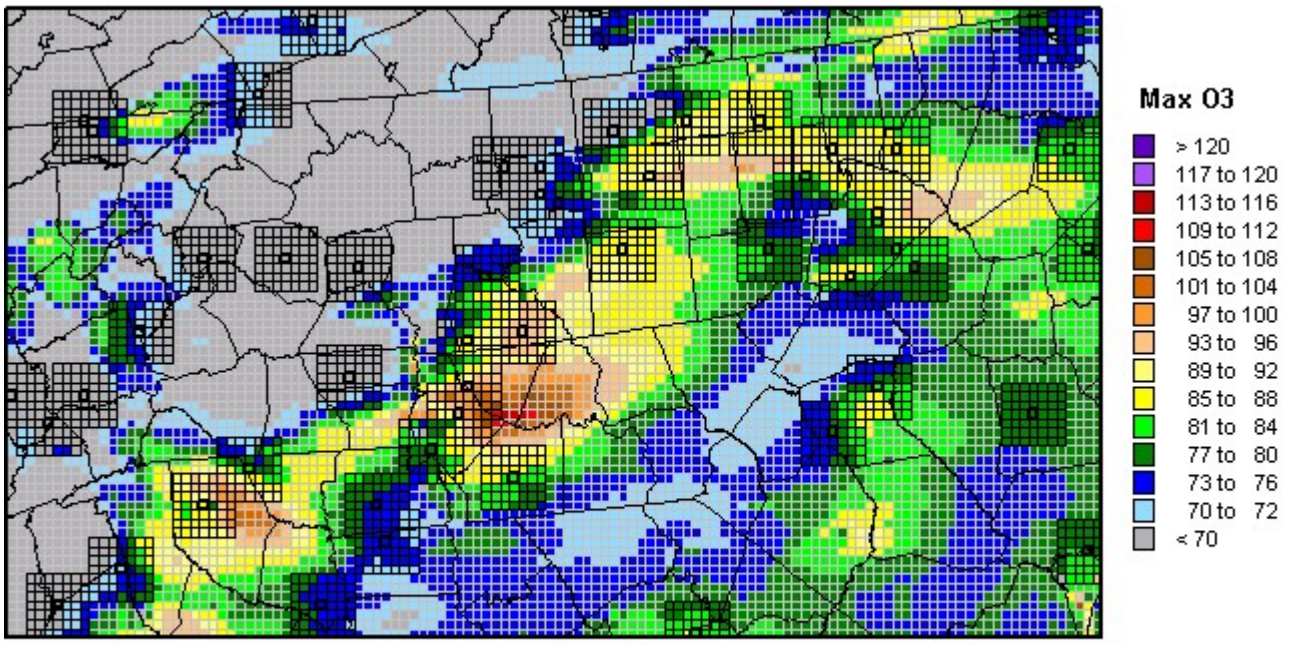


Figure 33. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for June 23, 1996.

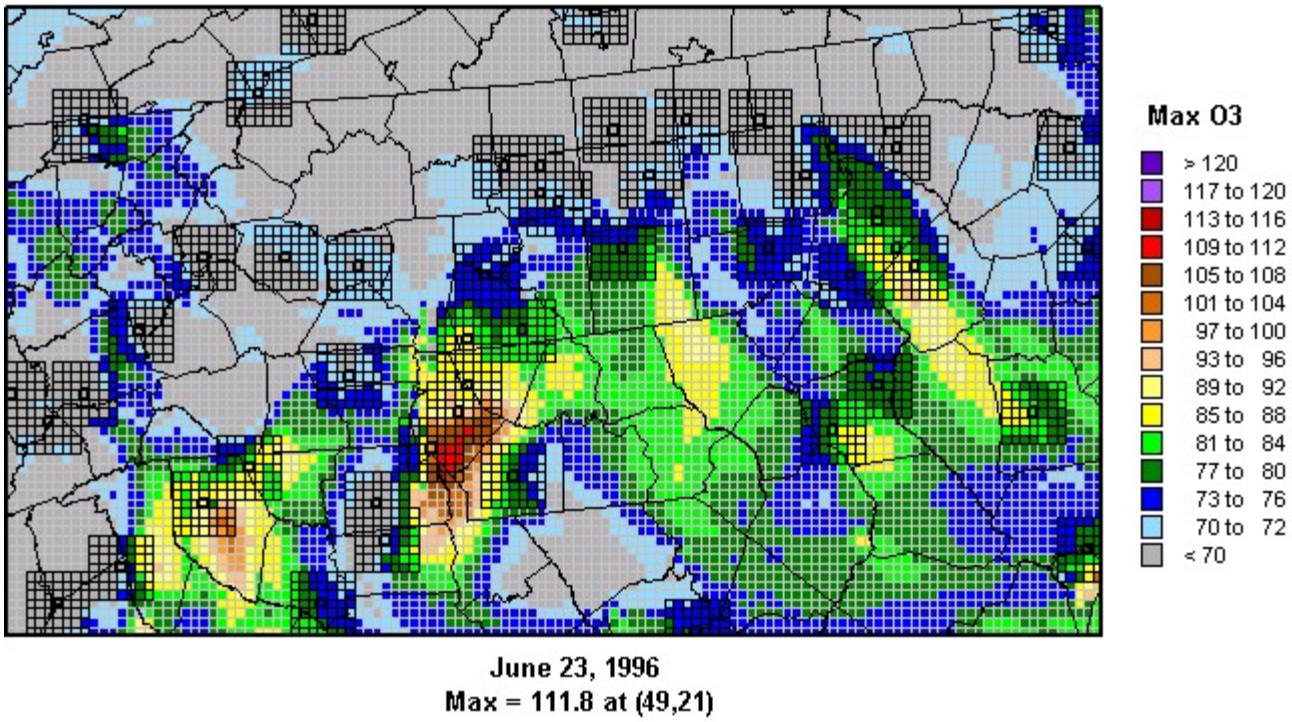


Figure 34. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for June 24, 1996.

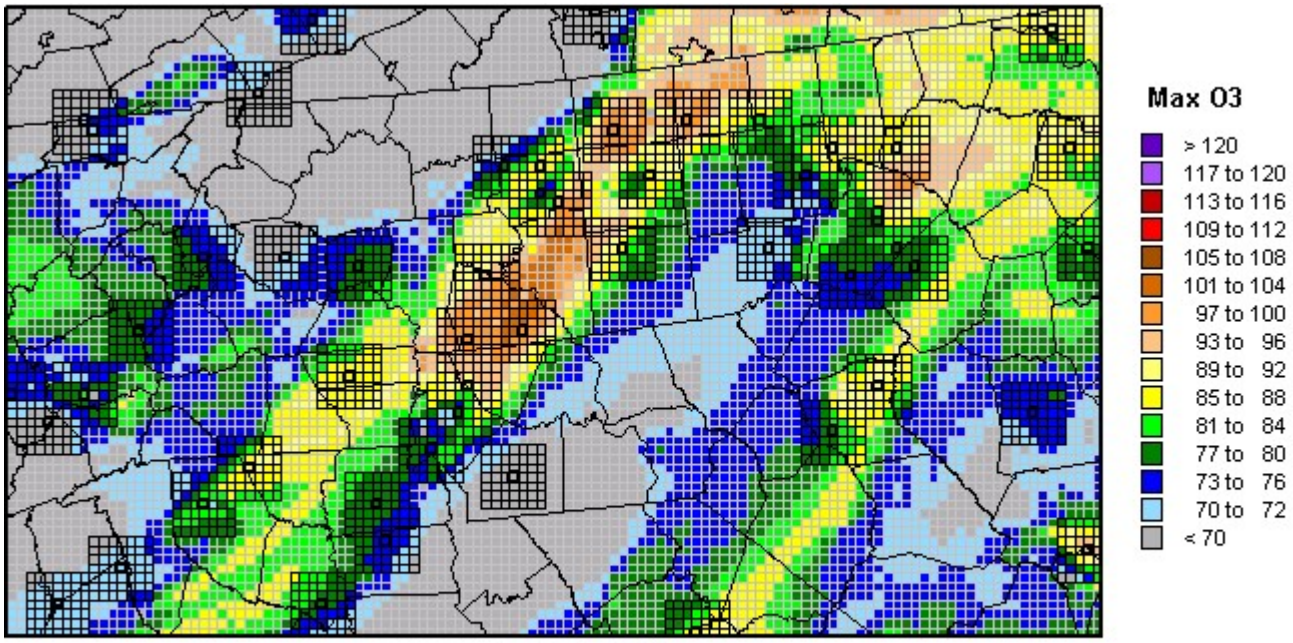


Figure 35. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for June 27, 1996.

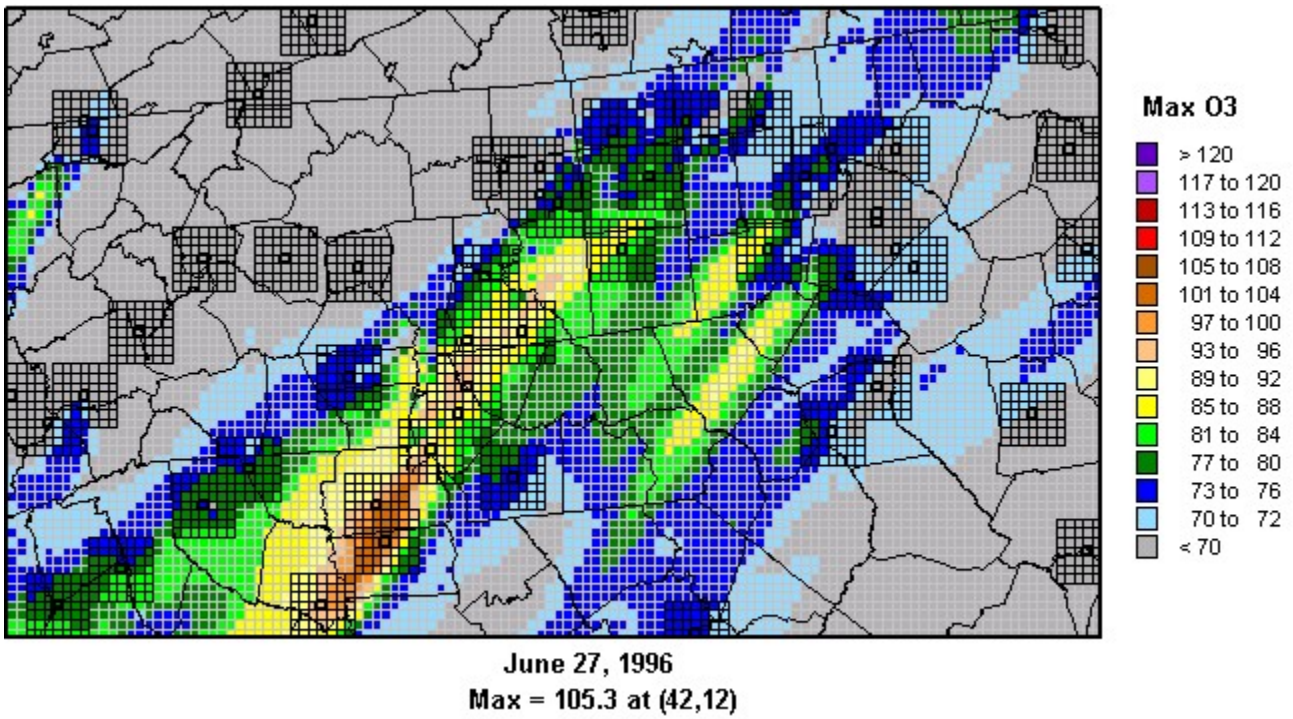


Figure 36. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for June 28, 1996.

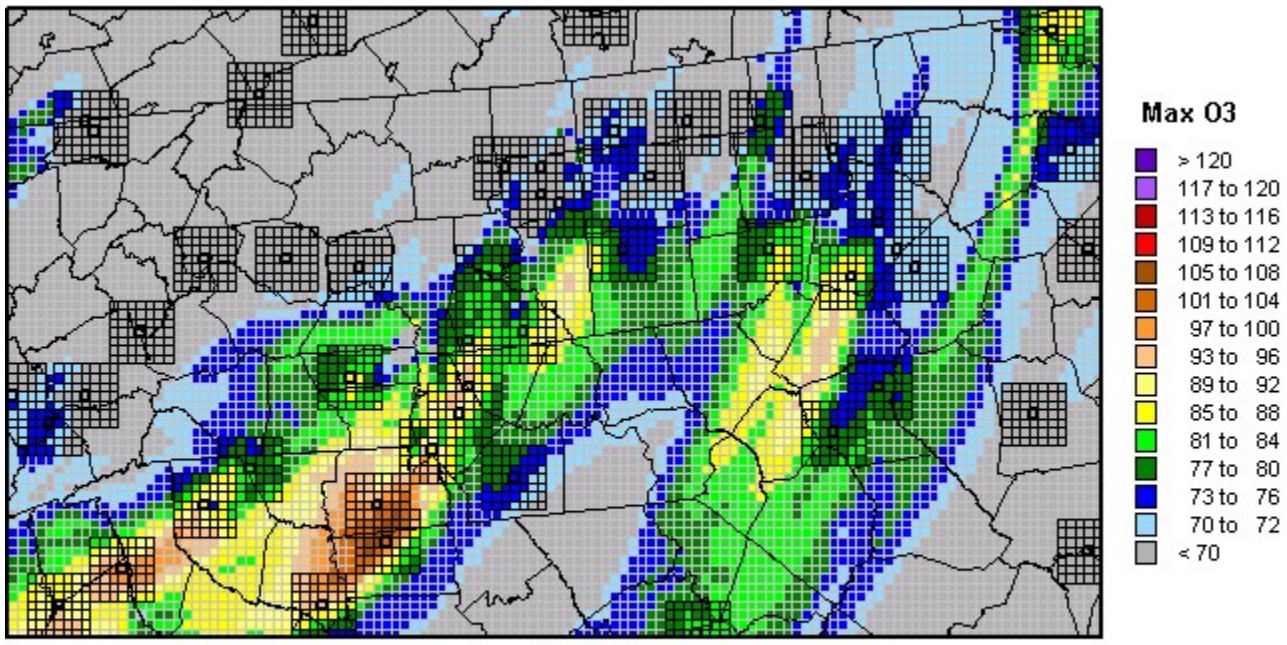


Figure 37. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for June 29, 1996.

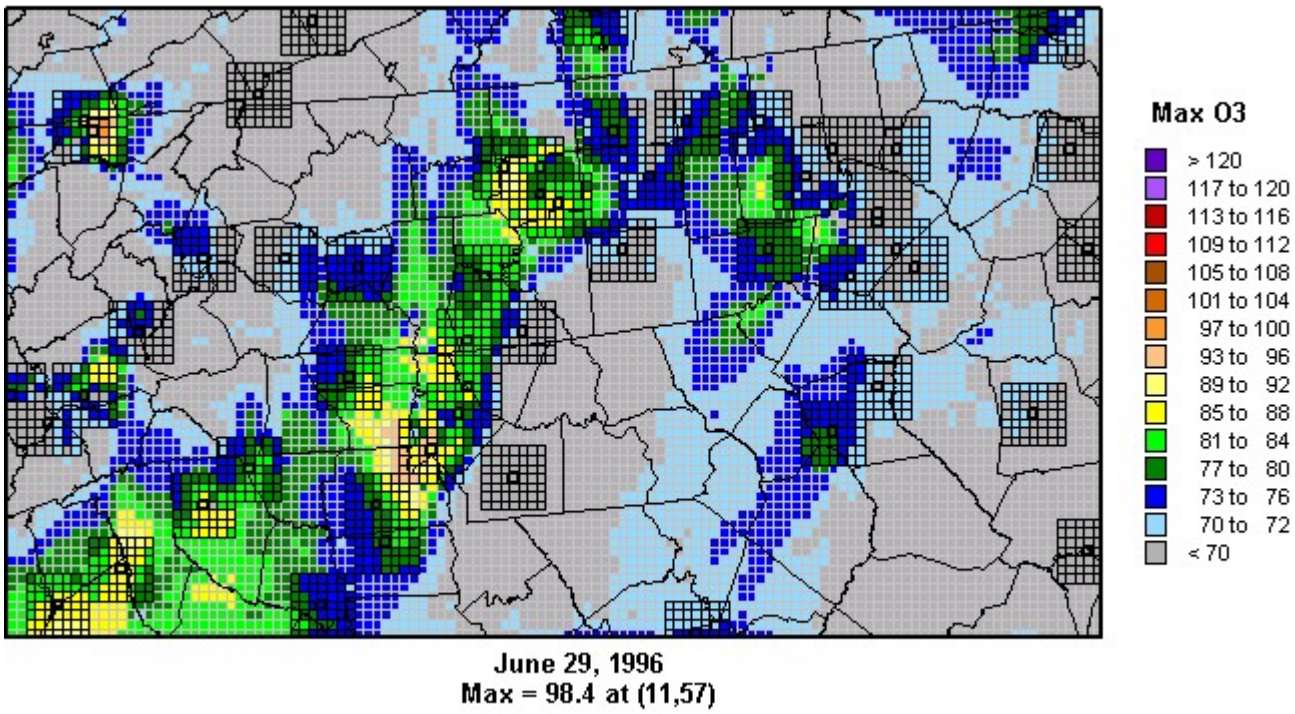


Figure 38. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for June 30, 1996.

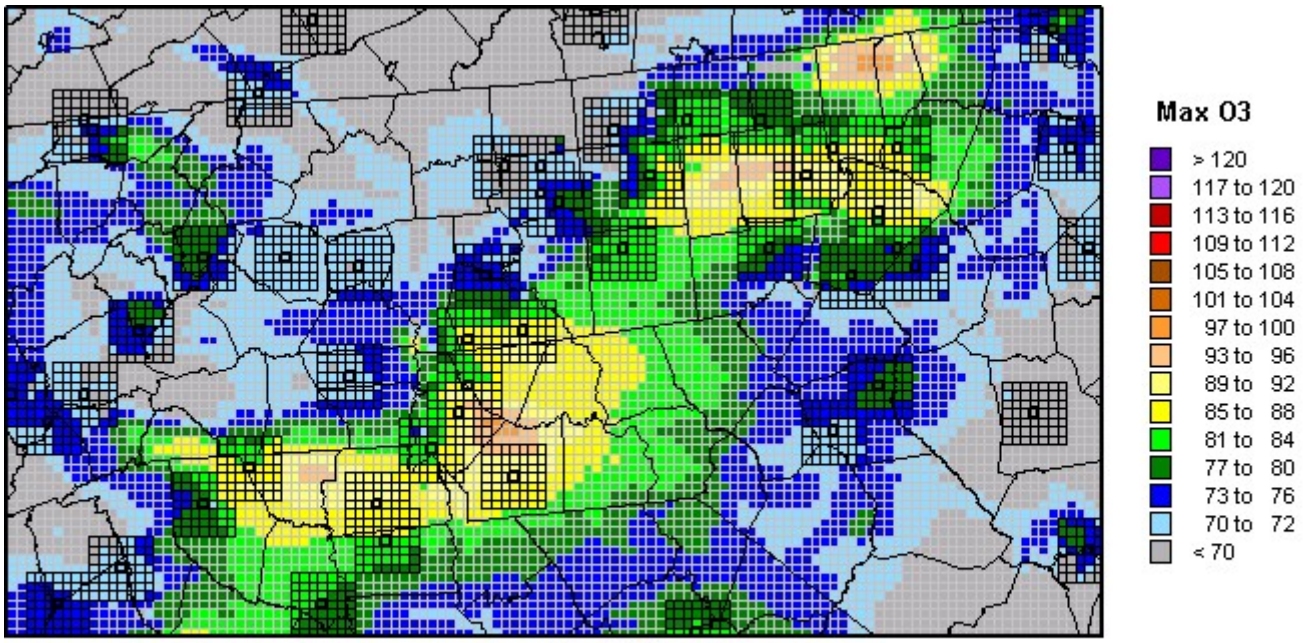


Figure 39. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for July 12, 1997.

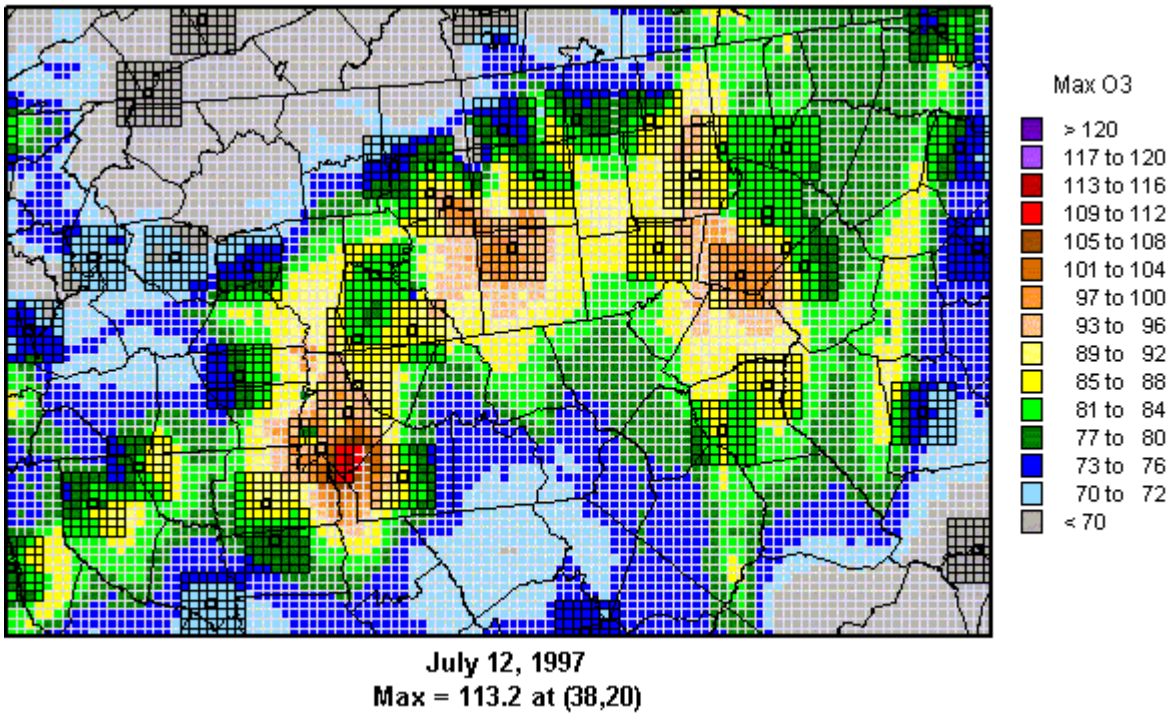


Figure 40. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for July 13, 1997.

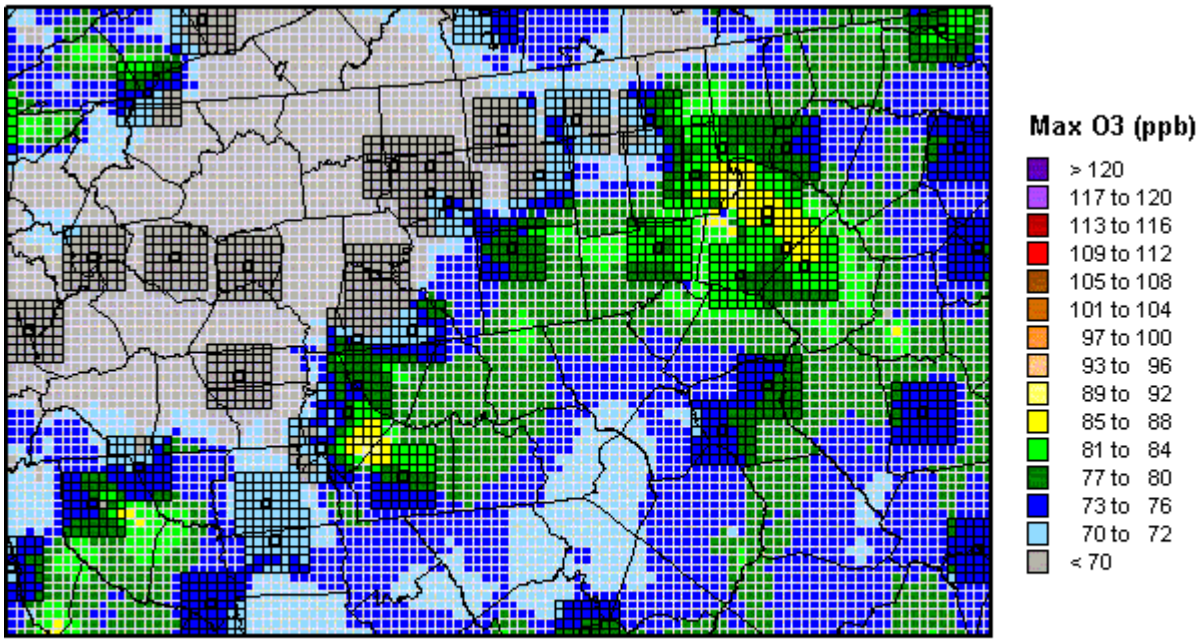


Figure 41. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for July 14, 1997.

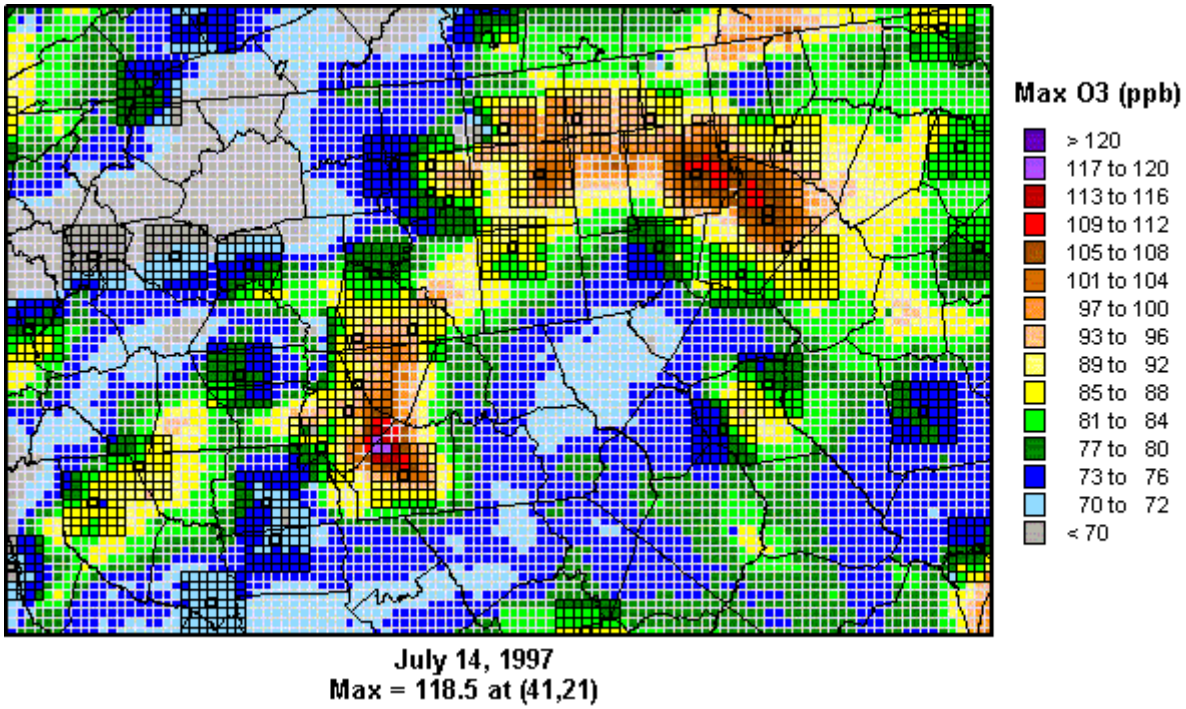
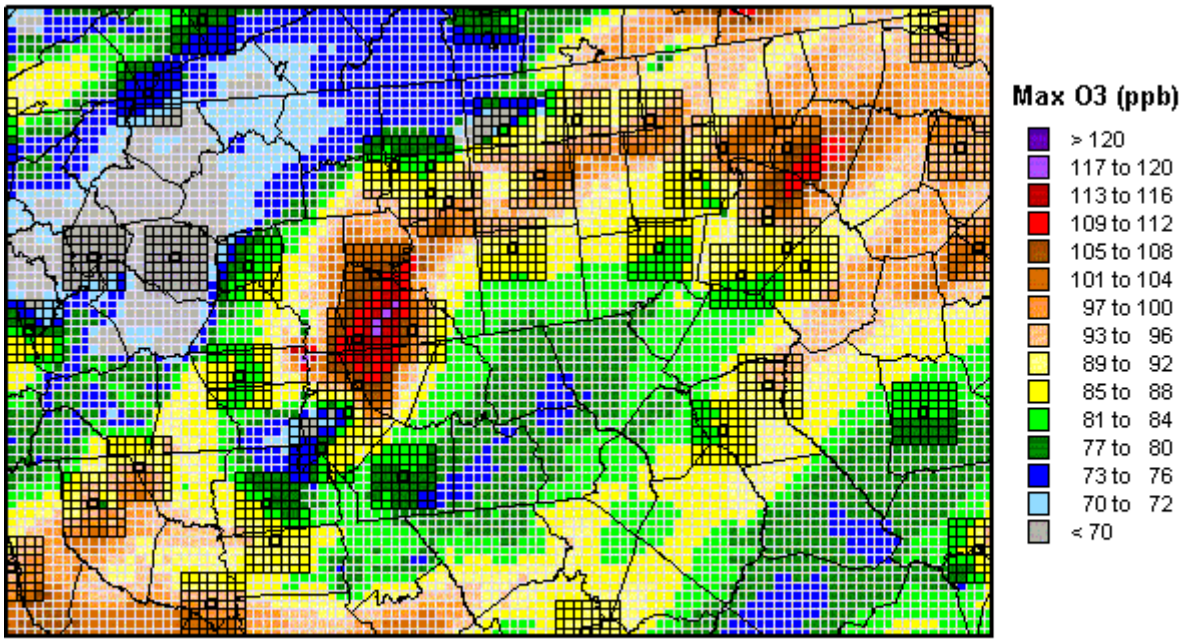


Figure 42. Absolute predicted 8-hour daily maximum ozone concentrations in the NCDAQ 4-km modeling domain for July 15, 1997.



July 15, 1997
Max = 119.5 at (33,31)

3 Daily Relative Reduction Factors

Table 15 below describes the daily Relative Reduction Factors at each monitor for each episode. Relative Reduction Factors (RRFs) in ***red*** are calculated from the 12km modeling domain where the 4km domain did not cover the monitor's location. All other RRFs are from the 4km modeling domain. Blank cells indicate days where the modeled attainment test was not applied due to <= 70ppb predicted current 8-hour daily maximums.

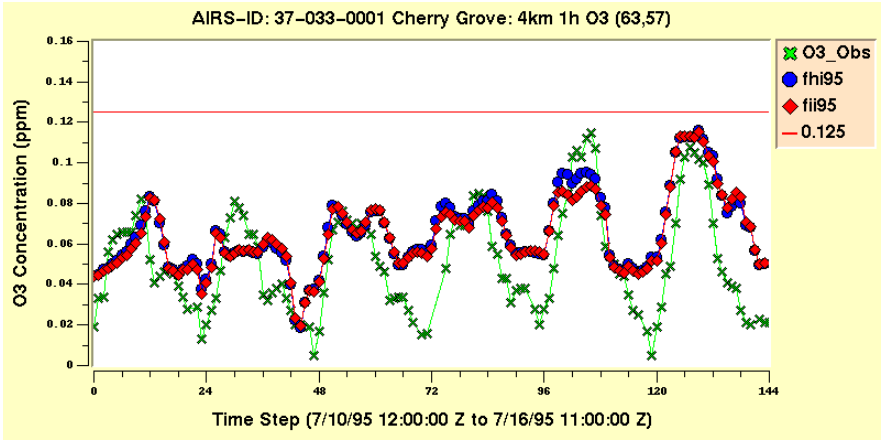
Table 15. Daily Relative Reduction Factors

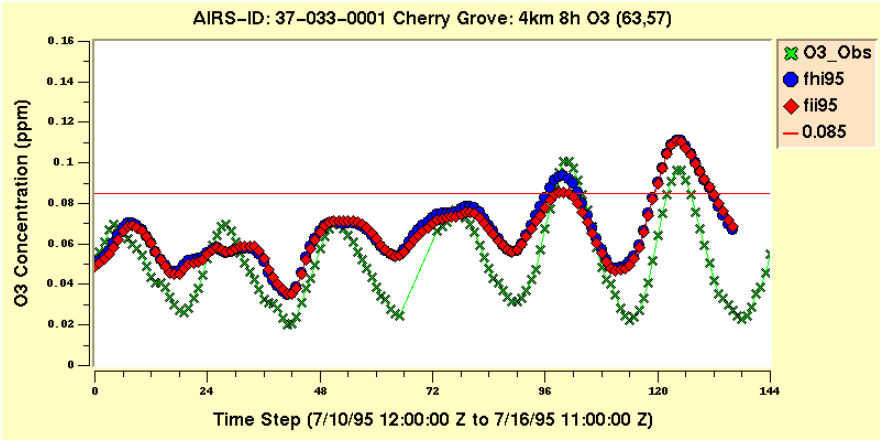
EAC/Monitor	**1995 Episode**				**1996 Episode 1**				**1996 Episode 2**				**1997 Episode**			
	7/12	**7/13**	**7/14**	**7/15**	**6/21**	**6/22**	**6/23**	**6/24**	**6/27**	**6/28**	**6/29**	**6/30**	**7/12**	**7/13**	**7/14**	**7/15**
Asheville EAC																
Bent Creek		***0.87***	***1.00***	***0.94***	0.96	0.88	0.88	0.89	0.93	0.93	0.91	0.91	***0.88***	***0.89***	***0.88***	***0.84***
Frying Pan		***0.82***	***1.05***	***0.97***	0.92	0.99	0.94	0.86	0.92	0.92	0.93	0.89	***0.95***			***0.90***
Purchase Knob				***0.93***	***0.87***	***0.87***		***0.85***	***0.93***	***0.91***	***0.95***	***0.88***	***0.93***		***0.96***	***0.90***
Waynesville		***0.94***	***1.04***	***0.93***	0.89	0.89	0.85	0.88		0.92	0.92	0.88	***0.93***			***0.89***
Unifour EAC																
Lenoir		0.87	0.89	0.86			0.90	0.85			0.88	0.90	0.90		0.86	
Taylorsville		0.87	0.90	0.88		0.87	0.86	0.87		0.90	0.88	0.87	0.91		0.89	0.90
Triad EAC																
Bethany	0.87	0.79	0.87	0.73	0.97	0.84	0.86	0.88	0.95	0.87	0.83	0.81	0.87	0.85	0.80	0.87
Cherry Grove	0.86	0.86	0.86	0.81	0.99	0.80	0.91	0.86	0.96	0.89	0.84	0.75	0.87	0.86	0.79	0.86
Cooleemee	0.91	0.90	0.90	0.89	0.97	0.89	0.89	0.86	0.93	0.93	0.89	0.86	0.89		0.91	0.91
Hattie Avenue	0.86	0.85	0.88	0.81	0.99	0.88	0.85	0.88	0.95	0.95	0.91	0.87	0.87	0.88	0.87	0.88
Mcleansville	0.90	0.88	0.87	0.76	0.96	0.85	0.82	0.87	0.93	0.89	0.91	0.84	0.87	0.83	0.86	0.88
Pollirosa	0.92	0.87	0.88	0.85			0.85	0.84	1.06	0.94	0.90	0.87	0.87	0.88	0.88	0.89
Shiloh	0.90	0.87	0.88	0.81		0.88	0.86	0.89	0.91	0.92	0.91	0.86	0.89	0.87	0.87	0.89
Sophia	0.88	0.87	0.88	0.85	0.89	0.86	0.82	0.91	0.89	0.91	0.88	0.84	0.83	0.80	0.86	0.90
Union	0.86	0.84	0.88	0.80	0.95	0.90	0.87	0.88	0.92	0.92	0.90	0.87	0.85	0.86	0.85	0.90
Fayetteville EAC																
Wade	***0.89***	***0.92***			0.87	0.93	0.85	0.90	0.96	0.94	0.94	0.92	0.93	0.88	0.87	0.93
Golfview	***0.89***	***0.92***			0.88	0.91	0.82	0.89	0.93	0.95	0.93	0.90	0.93	0.88	0.87	0.95

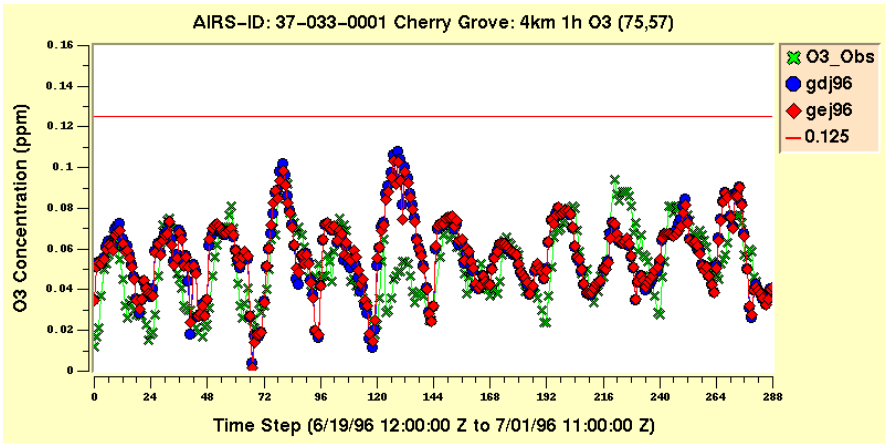
Appendix A

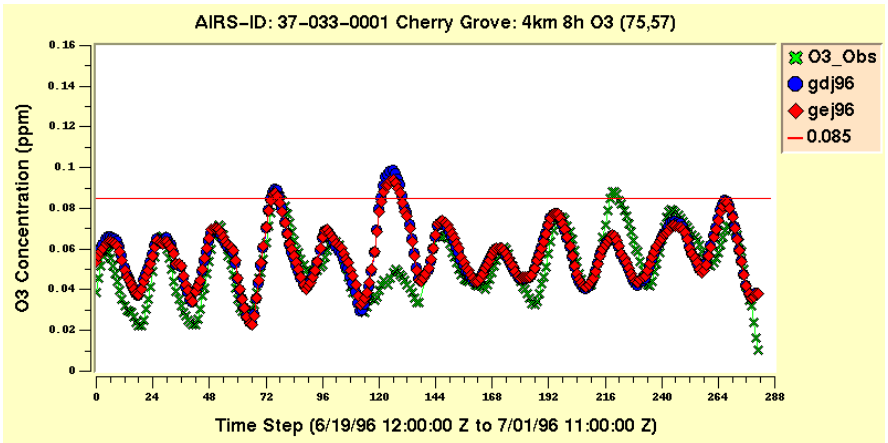
Monitor Time Series Plots

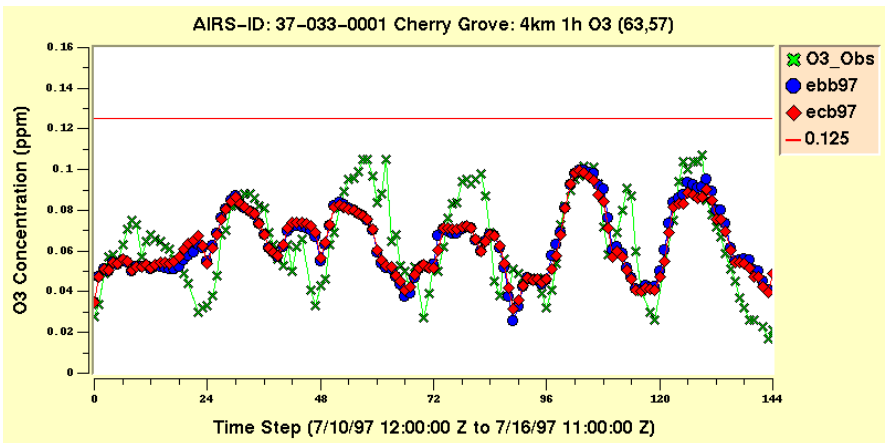
Triad EAC Area
Time Series Plots

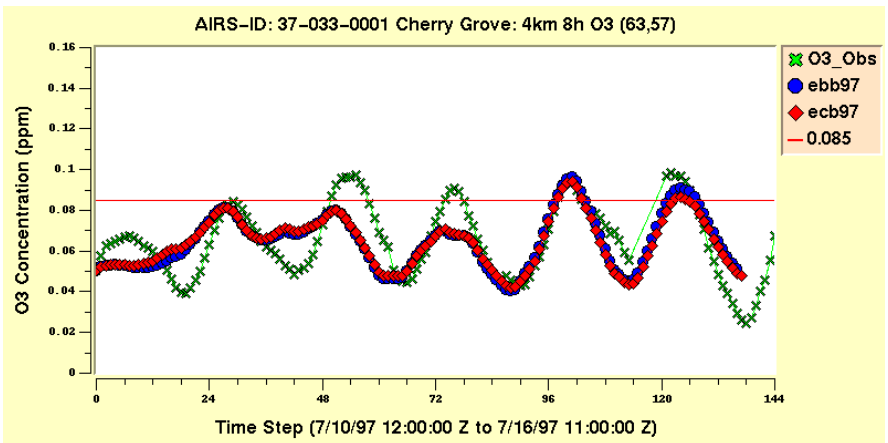

AIRS-ID: 37-033-0001 Cherry Grove: 4km 1h O3 (63,57)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125

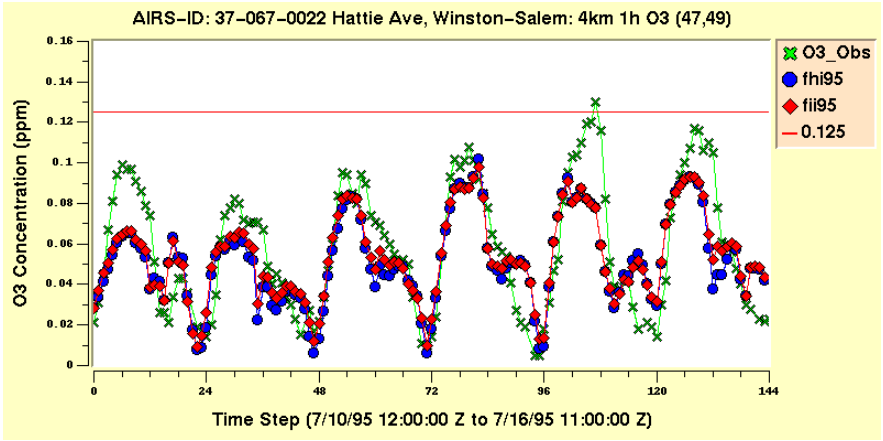

AIRS-ID: 37-033-0001 Cherry Grove: 4km 8h O3 (63,57)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

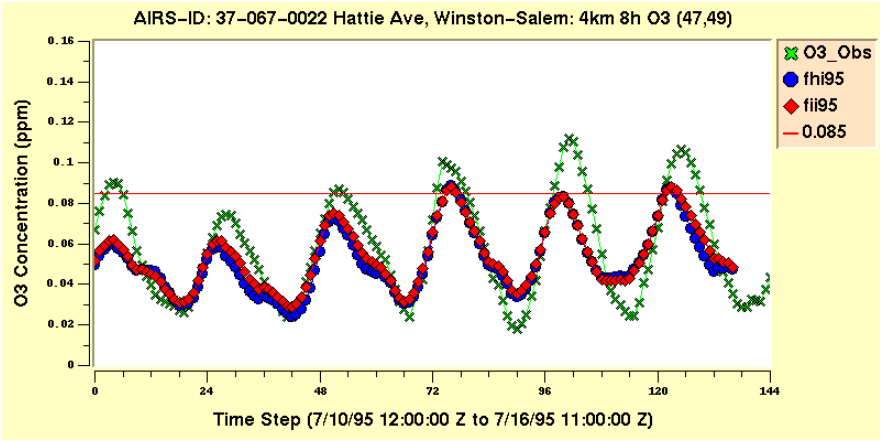

AIRS-ID: 37-033-0001 Cherry Grove: 4km 1h O3 (75,57)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

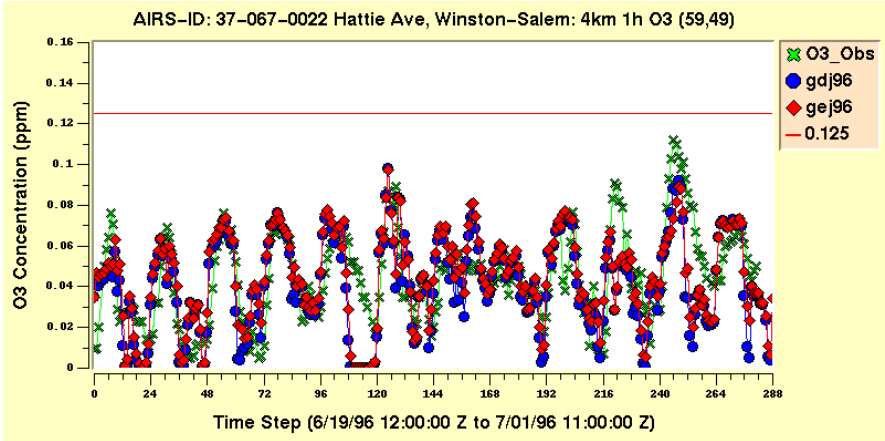

AIRS-ID: 37-033-0001 Cherry Grove: 4km 8h O3 (75,57)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

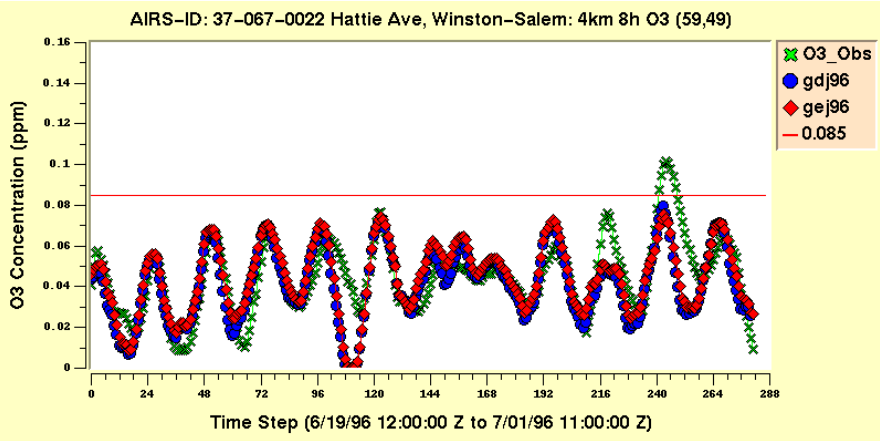

AIRS-ID: 37-033-0001 Cherry Grove: 4km 1h O3 (63,57)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

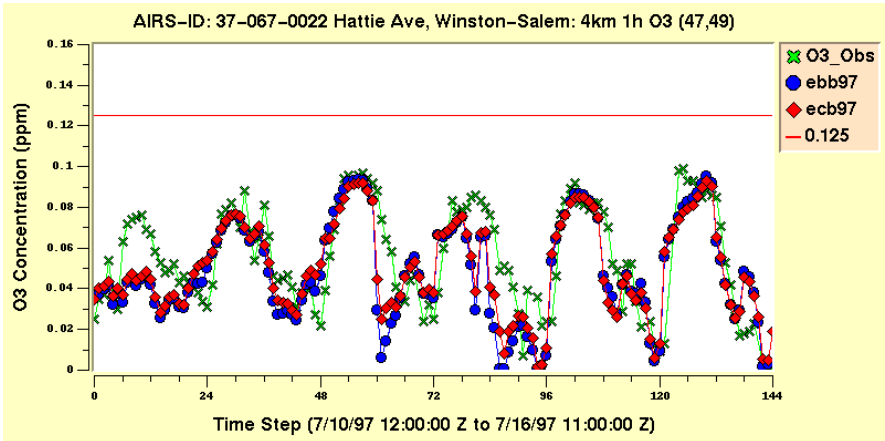

AIRS-ID: 37-033-0001 Cherry Grove: 4km 8h O3 (63,57)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

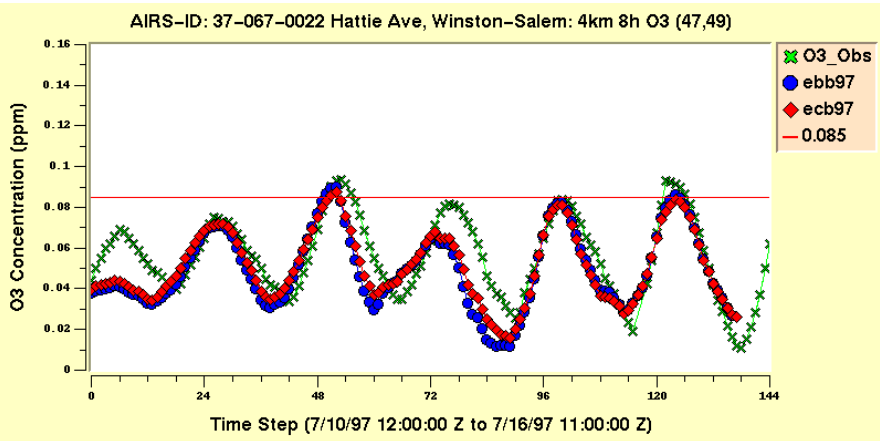

AIRS-ID: 37-067-0022 Hattie Ave, Winston-Salem: 4km 1h O3 (47,49)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125

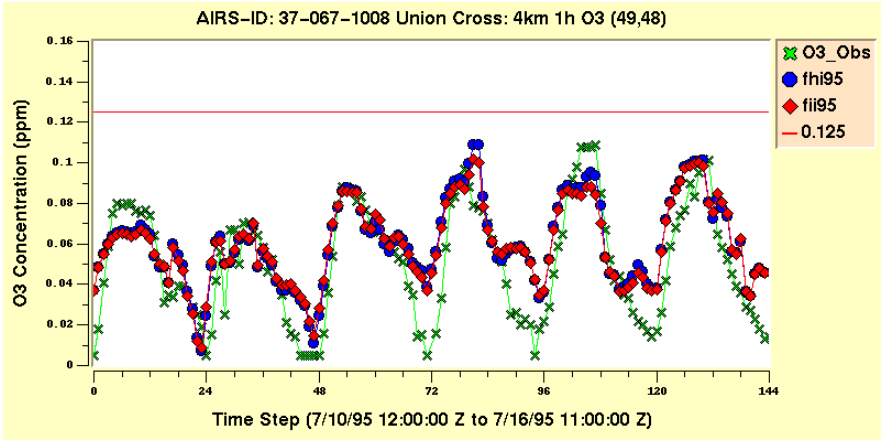

AIRS-ID: 37-067-0022 Hattie Ave, Winston-Salem: 4km 8h O3 (47,49)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

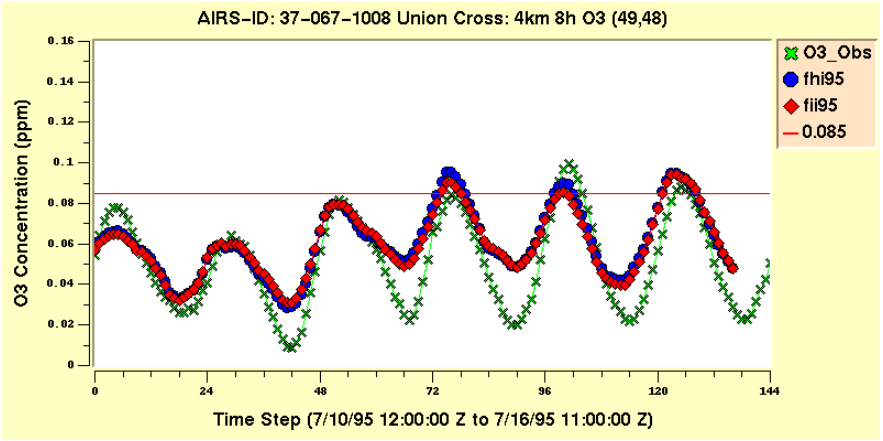

AIRS-ID: 37-067-0022 Hattie Ave, Winston-Salem: 4km 1h O3 (59,49)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

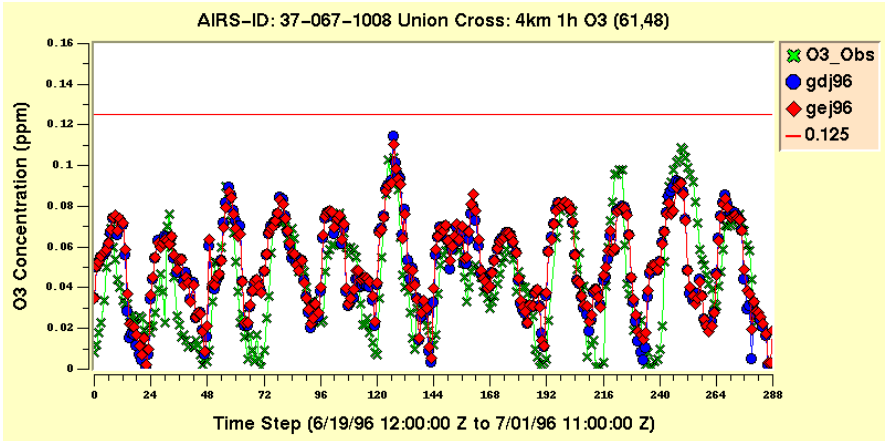

AIRS-ID: 37-067-0022 Hattie Ave, Winston-Salem: 4km 8h O3 (59,49)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

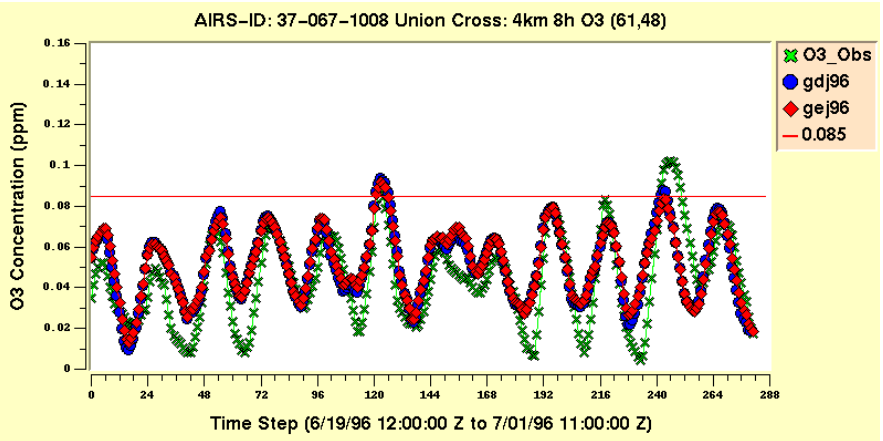

AIRS-ID: 37-067-0022 Hattie Ave, Winston-Salem: 4km 1h O3 (47,49)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

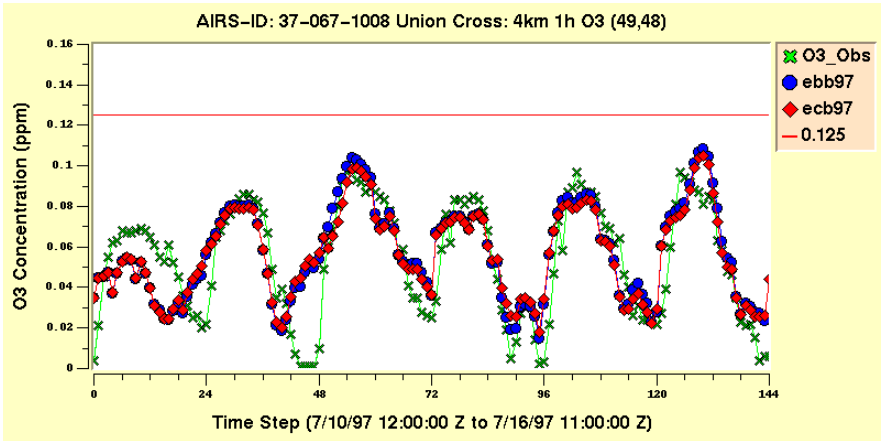

AIRS-ID: 37-067-0022 Hattie Ave, Winston-Salem: 4km 8h O3 (47,49)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

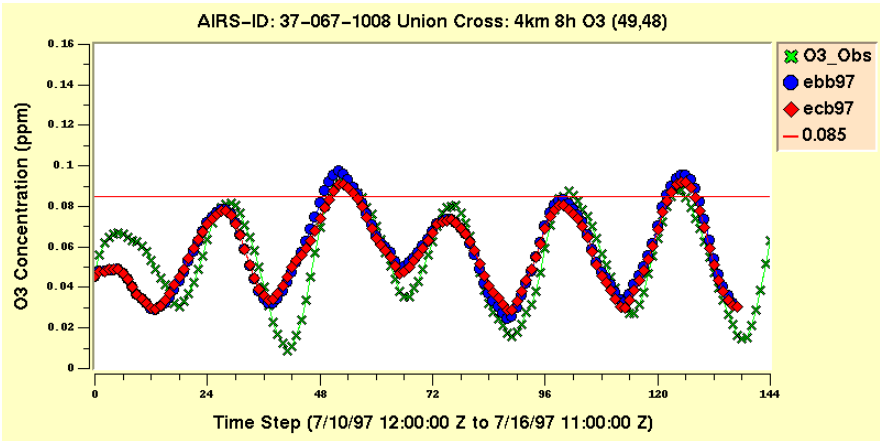

AIRS-ID: 37-067-1008 Union Cross: 4km 1h O3 (49,48)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fli95
0.125

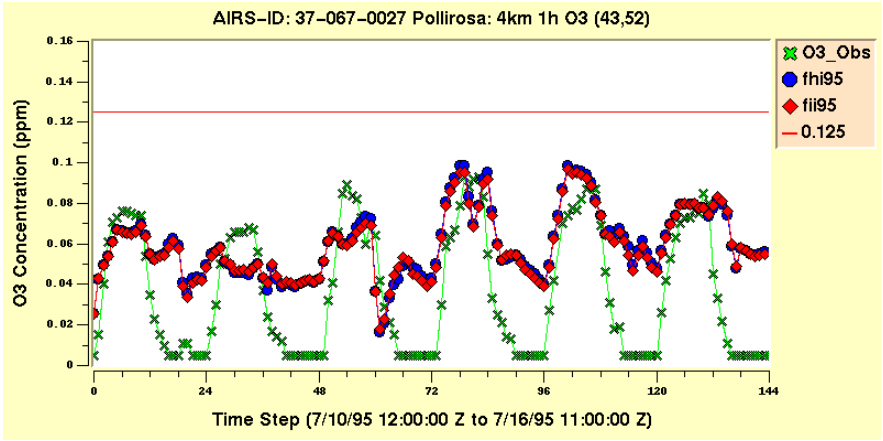

AIRS-ID: 37-067-1008 Union Cross: 4km 8h O3 (49,48)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fli95
0.085

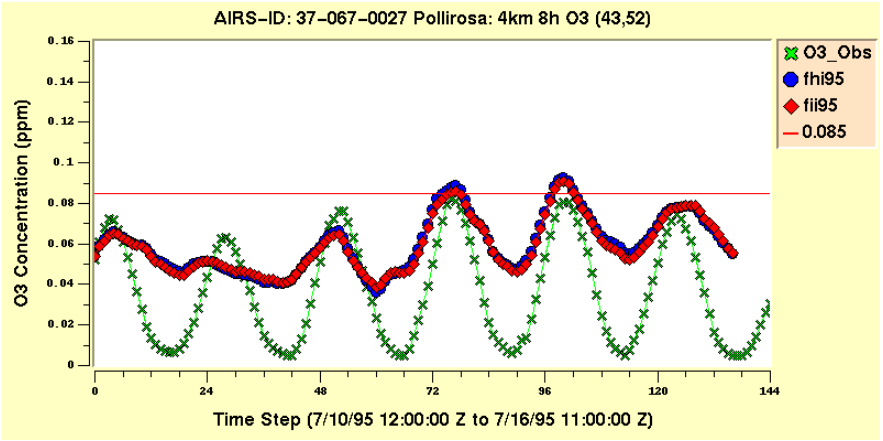

AIRS-ID: 37-067-1008 Union Cross: 4km 1h O3 (61,48)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

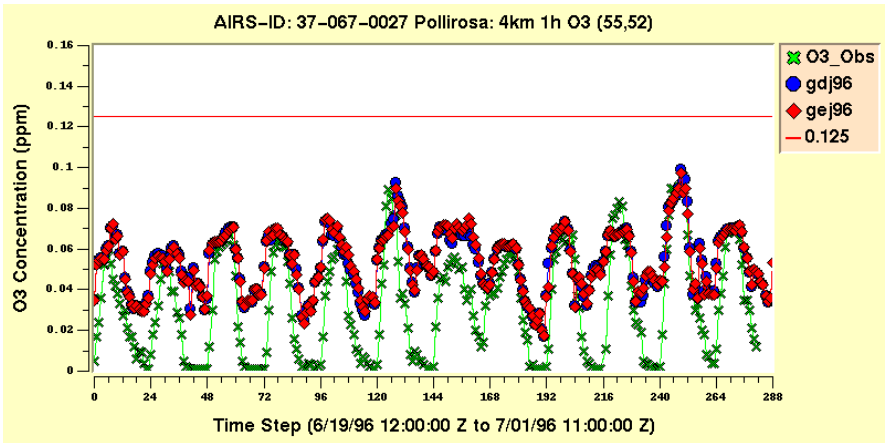

AIRS-ID: 37-067-1008 Union Cross: 4km 8h O3 (61,48)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

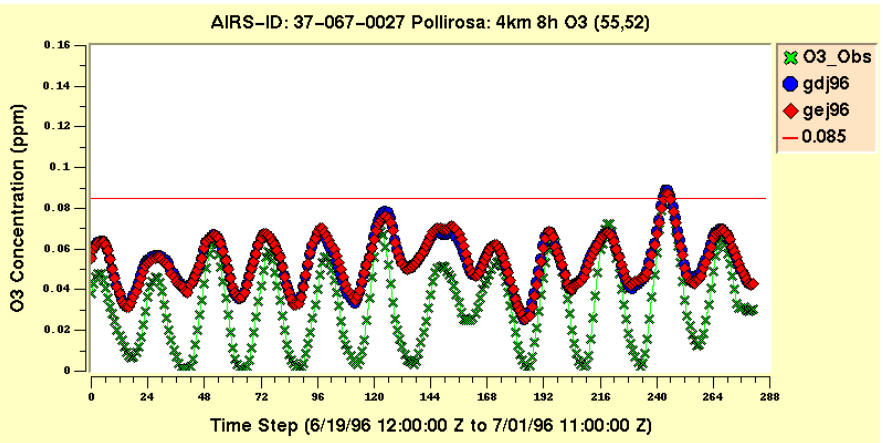

AIRS-ID: 37-067-1008 Union Cross: 4km 1h O3 (49,48)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

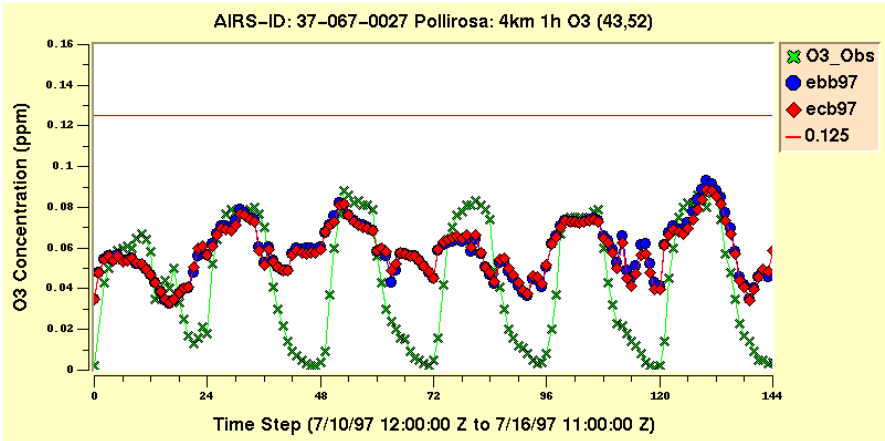

AIRS-ID: 37-067-1008 Union Cross: 4km 8h O3 (49,48)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

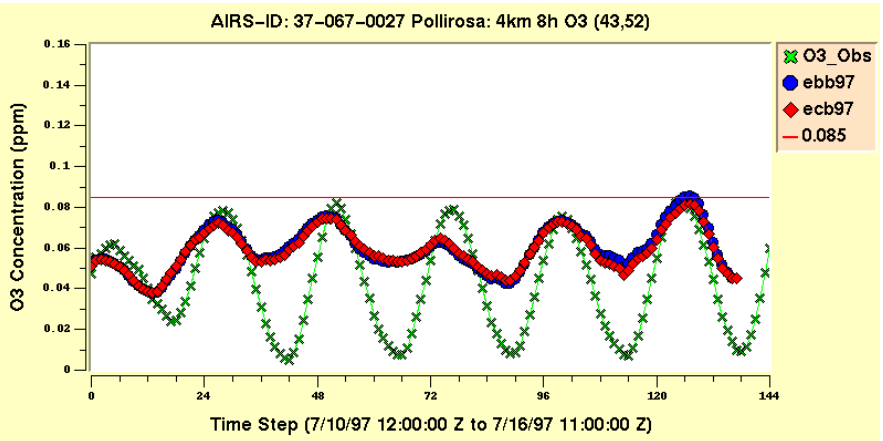

AIRS-ID: 37-067-0027 Pollirosa: 4km 1h O3 (43,52)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125

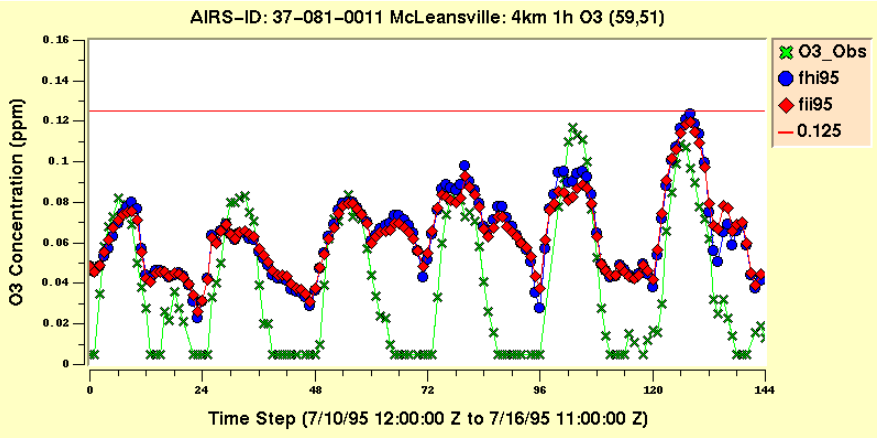

AIRS-ID: 37-067-0027 Pollirosa: 4km 8h O3 (43,52)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

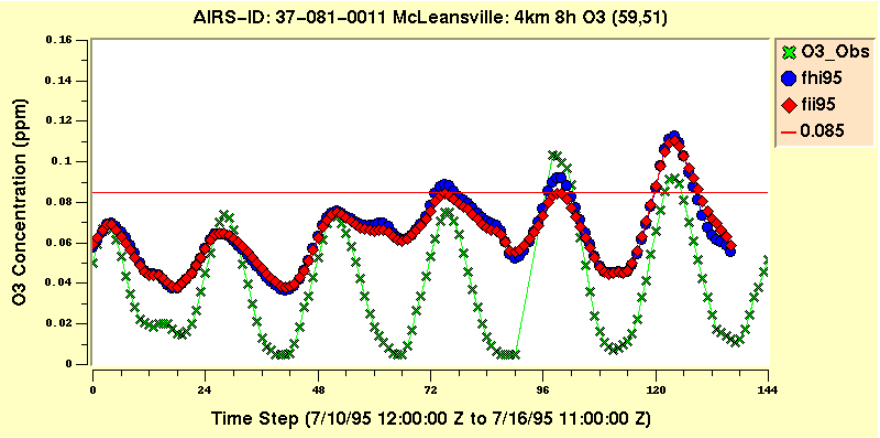

AIRS-ID: 37-067-0027 Pollirosa: 4km 1h O3 (55,52)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

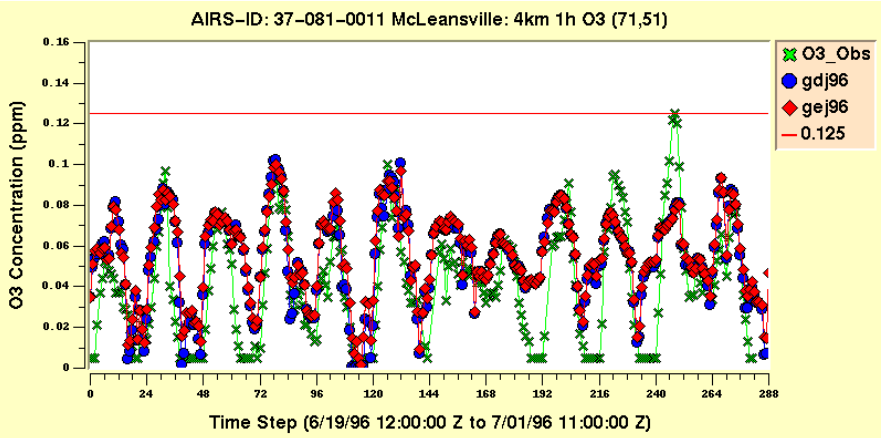

AIRS-ID: 37-067-0027 Pollirosa: 4km 8h O3 (55,52)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

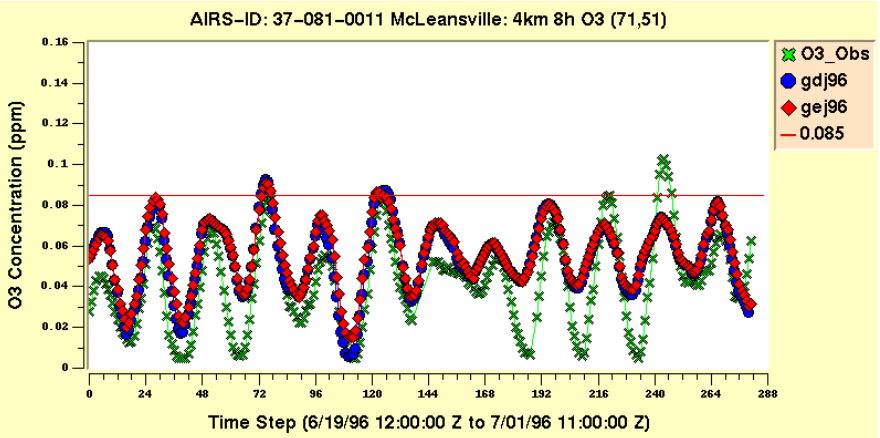

AIRS-ID: 37-067-0027 Pollirosa: 4km 1h O3 (43,52)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

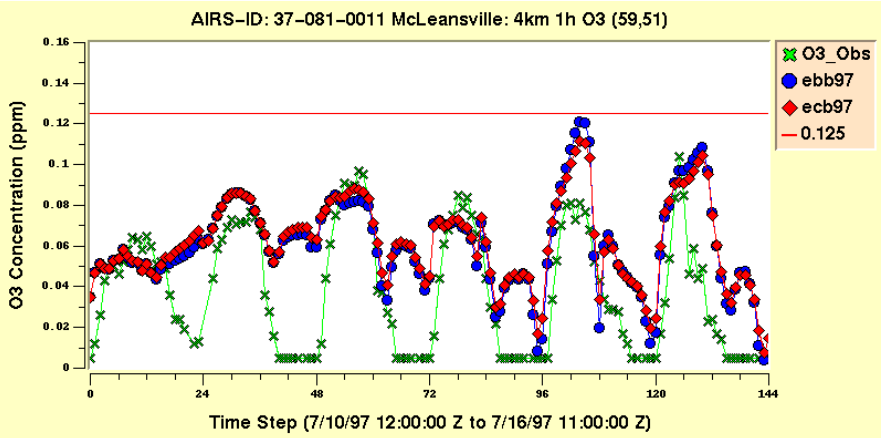

AIRS-ID: 37-067-0027 Pollirosa: 4km 8h O3 (43,52)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

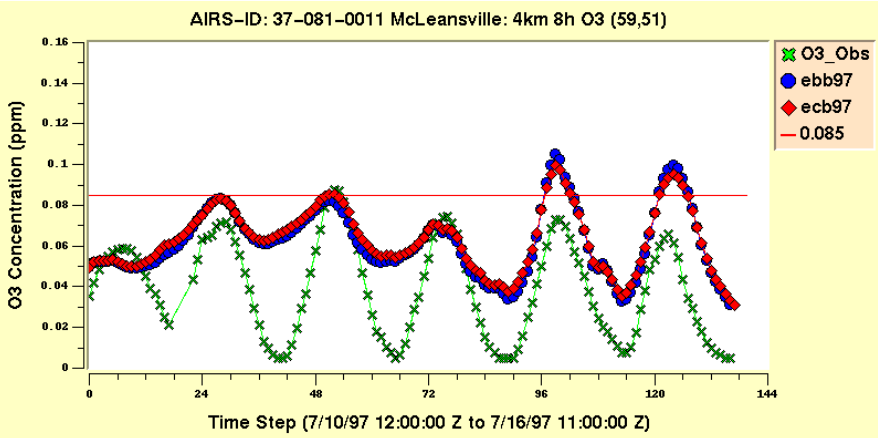

AIRS-ID: 37-081-0011 McLeansville: 4km 1h O3 (59,51)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125

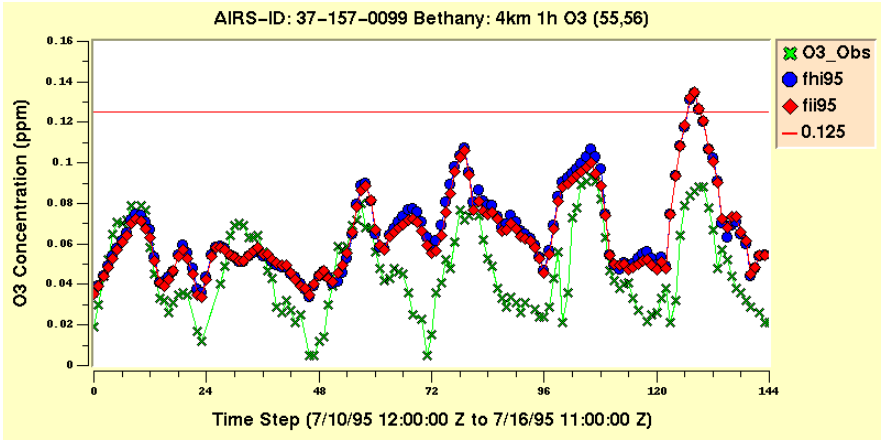

AIRS-ID: 37-081-0011 McLeansville: 4km 8h O3 (59,51)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

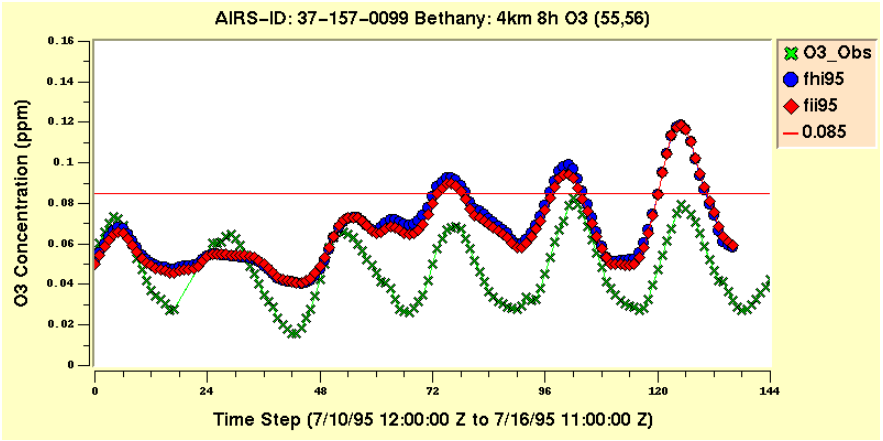

AIRS-ID: 37-081-0011 McLeansville: 4km 1h O3 (71,51)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

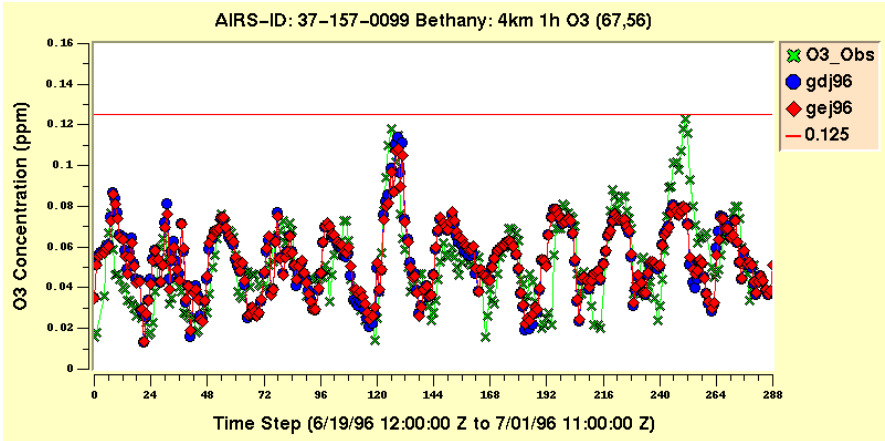

AIRS-ID: 37-081-0011 McLeansville: 4km 8h O3 (71,51)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

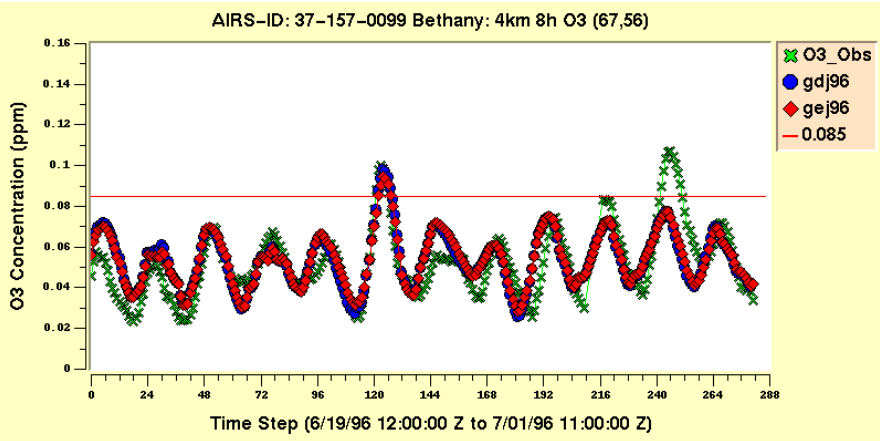

AIRS-ID: 37-081-0011 McLeansville: 4km 1h O3 (59,51)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

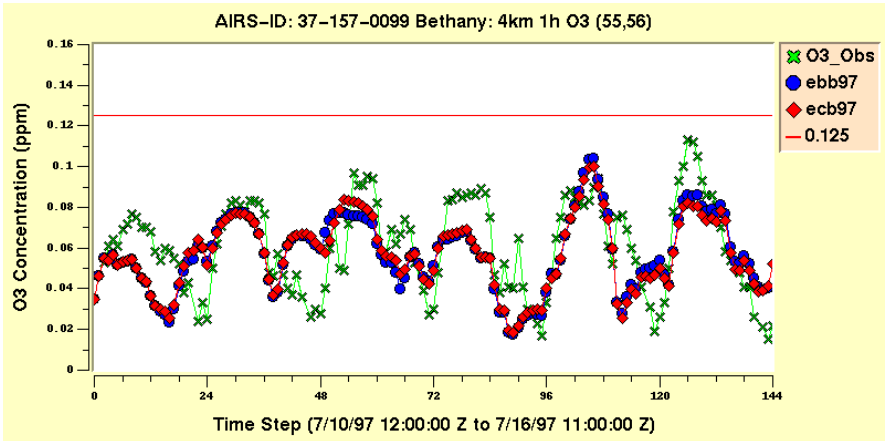

AIRS-ID: 37-081-0011 McLeansville: 4km 8h O3 (59,51)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

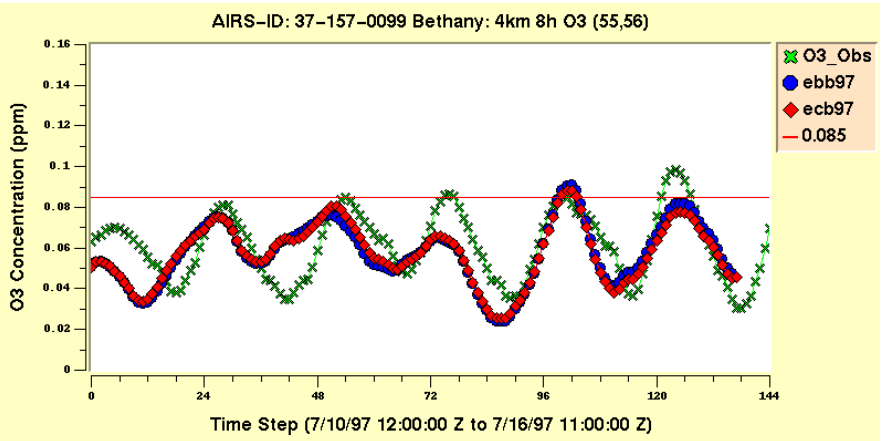

AIRS-ID: 37-157-0099 Bethany: 4km 1h O3 (55,56)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125

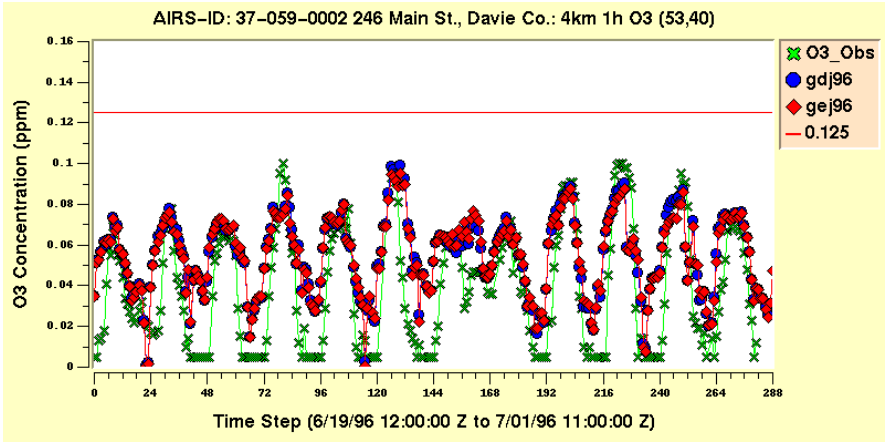

AIRS-ID: 37-157-0099 Bethany: 4km 8h O3 (55,56)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

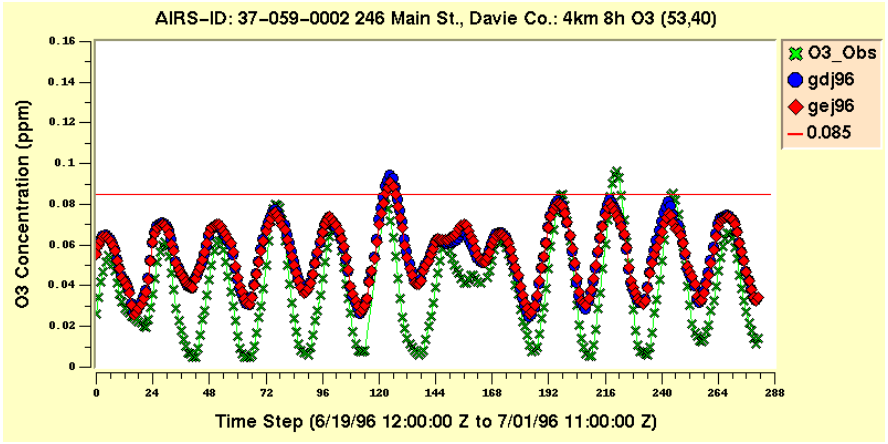

AIRS-ID: 37-157-0099 Bethany: 4km 1h O3 (67,56)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

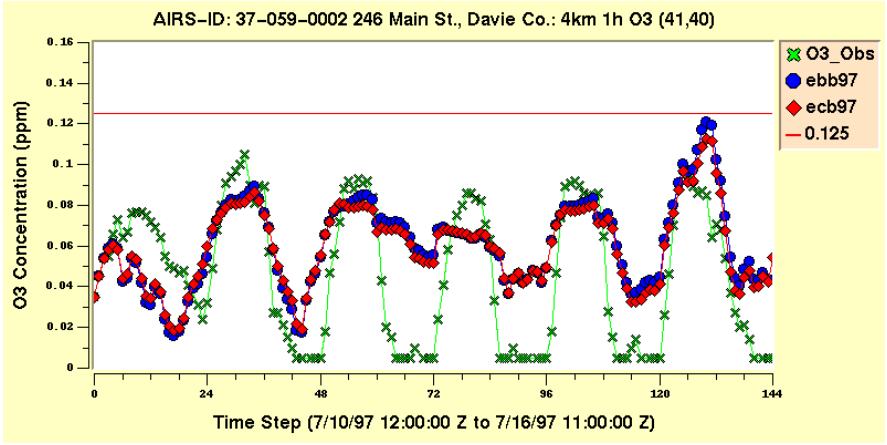

AIRS-ID: 37-157-0099 Bethany: 4km 8h O3 (67,56)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

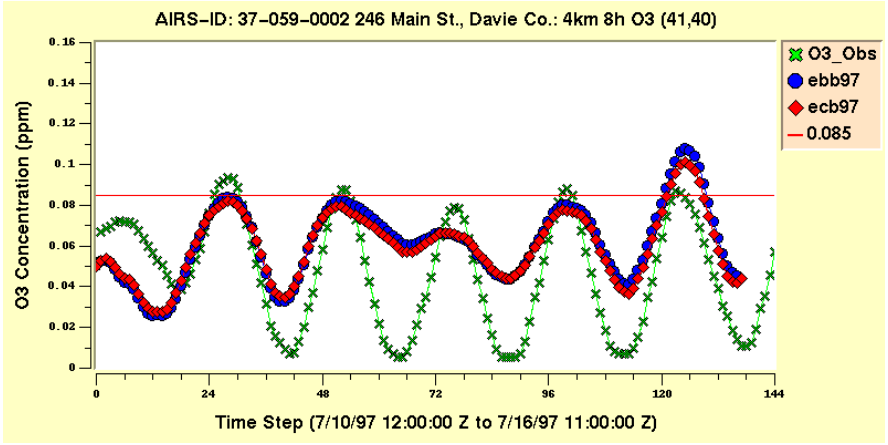

AIRS-ID: 37-157-0099 Bethany: 4km 1h O3 (55,56)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

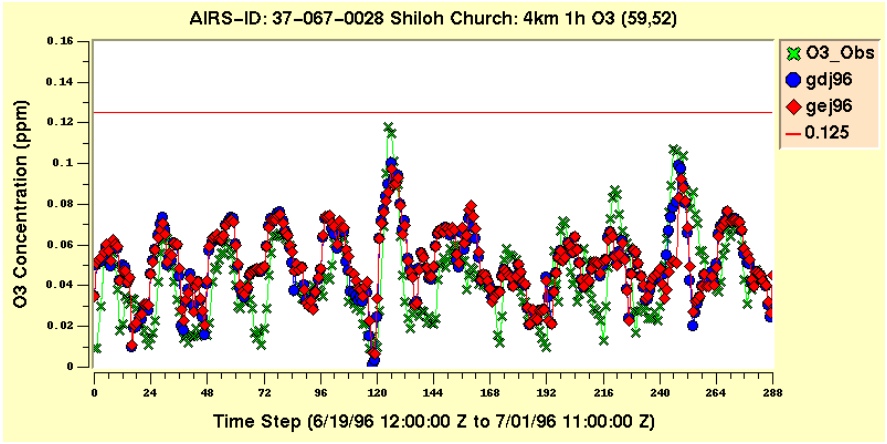

AIRS-ID: 37-157-0099 Bethany: 4km 8h O3 (55,56)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

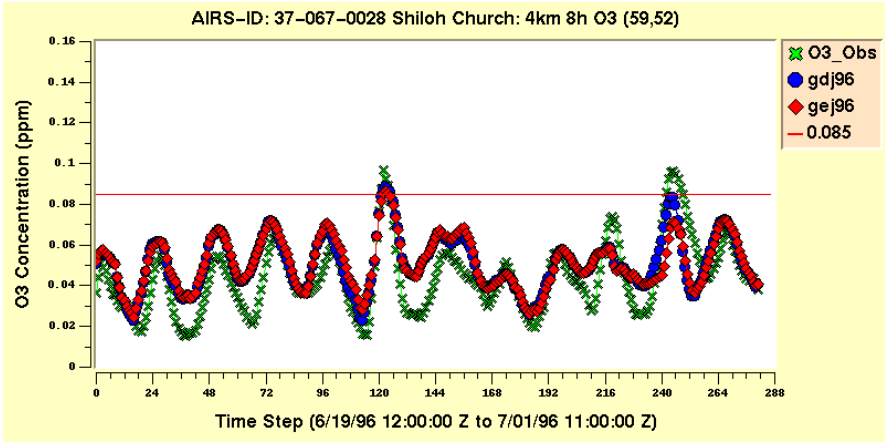

AIRS-ID: 37-059-0002 246 Main St., Davie Co.: 4km 1h O3 (53,40)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

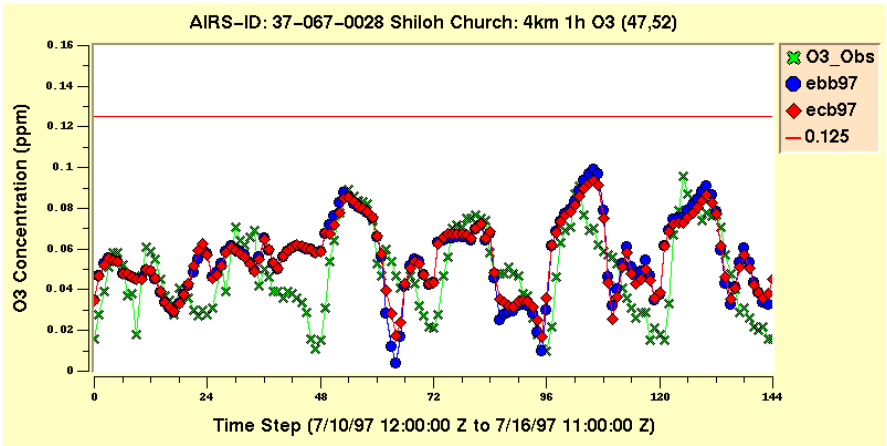

AIRS-ID: 37-059-0002 246 Main St., Davie Co.: 4km 8h O3 (53,40)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

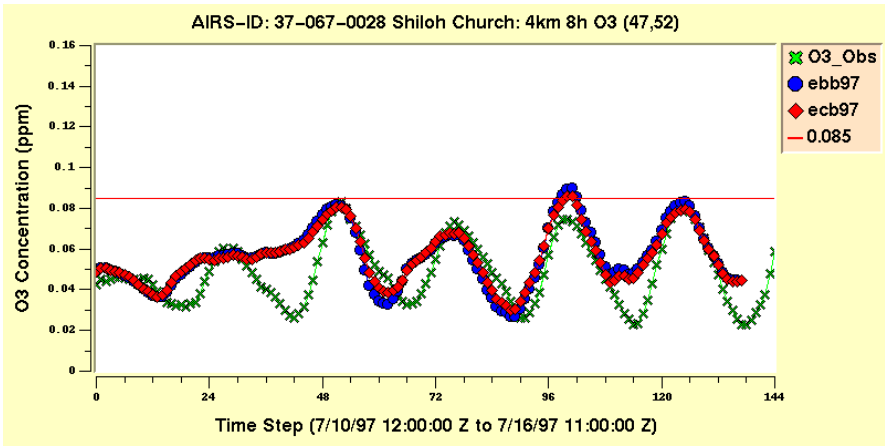

AIRS-ID: 37-059-0002 246 Main St., Davie Co.: 4km 1h O3 (41,40)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125


AIRS-ID: 37-059-0002 246 Main St., Davie Co.: 4km 8h O3 (41,40)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

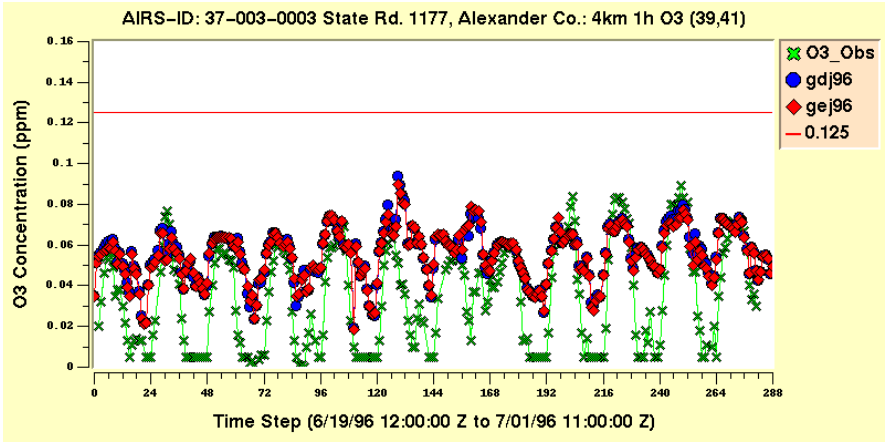

AIRS-ID: 37-067-0028 Shiloh Church: 4km 1h O3 (59,52)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

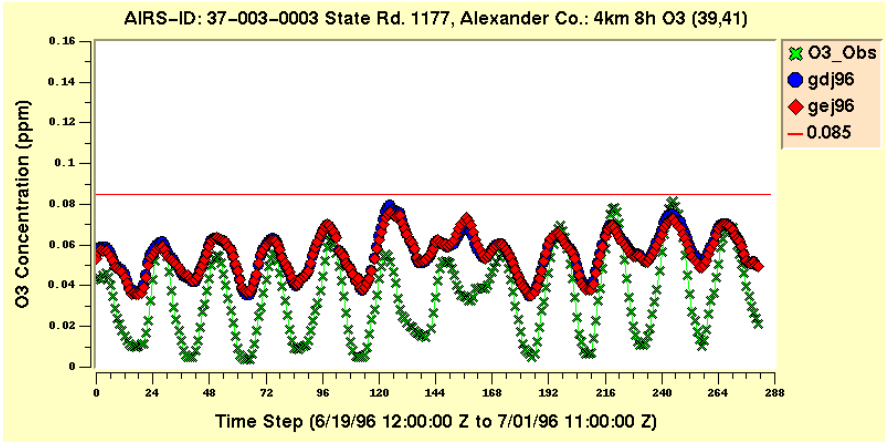

AIRS-ID: 37-067-0028 Shiloh Church: 4km 8h O3 (59,52)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

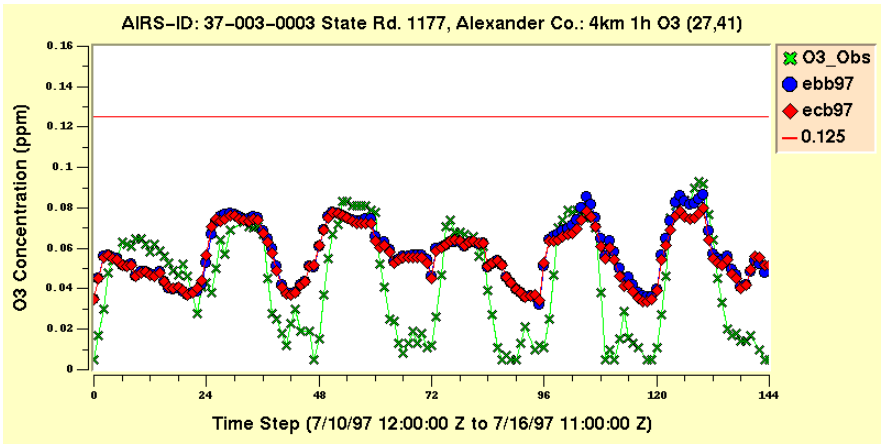

AIRS-ID: 37-067-0028 Shiloh Church: 4km 1h O3 (47,52)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

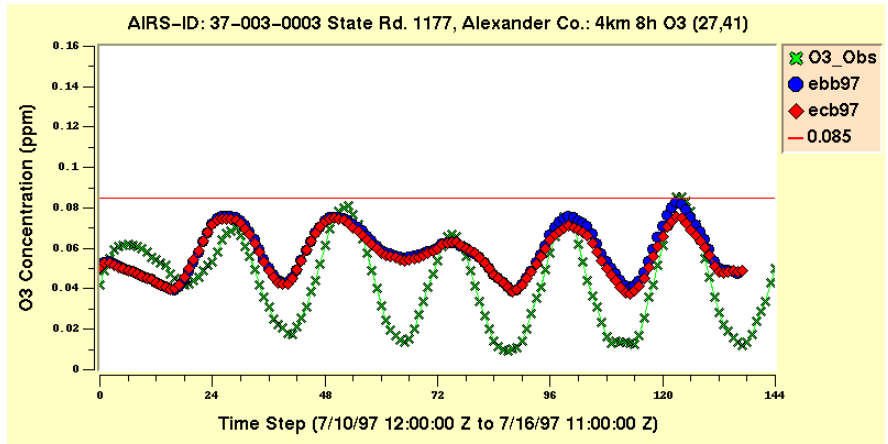

AIRS-ID: 37-067-0028 Shiloh Church: 4km 8h O3 (47,52)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

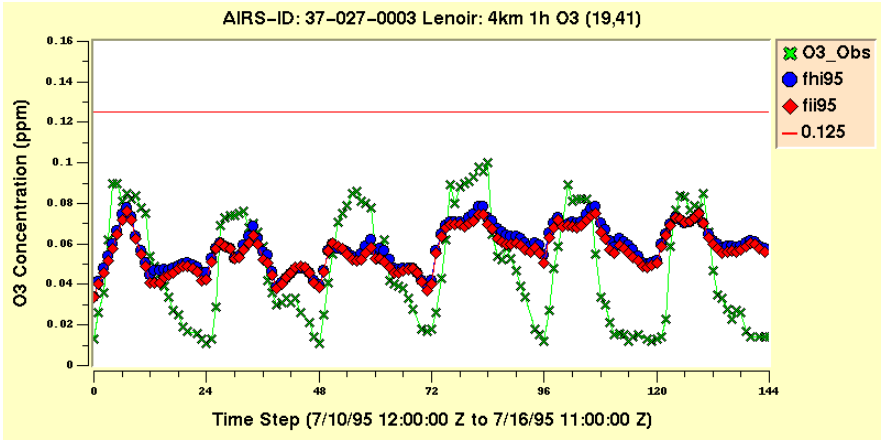
Unifour EAC Area
Time Series Plots

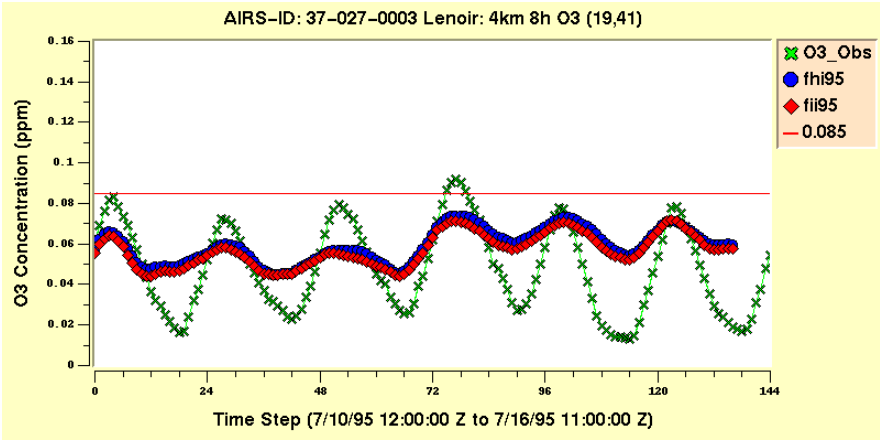

AIRS-ID: 37-003-0003 State Rd. 1177, Alexander Co.: 4km 1h O3 (39,41)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

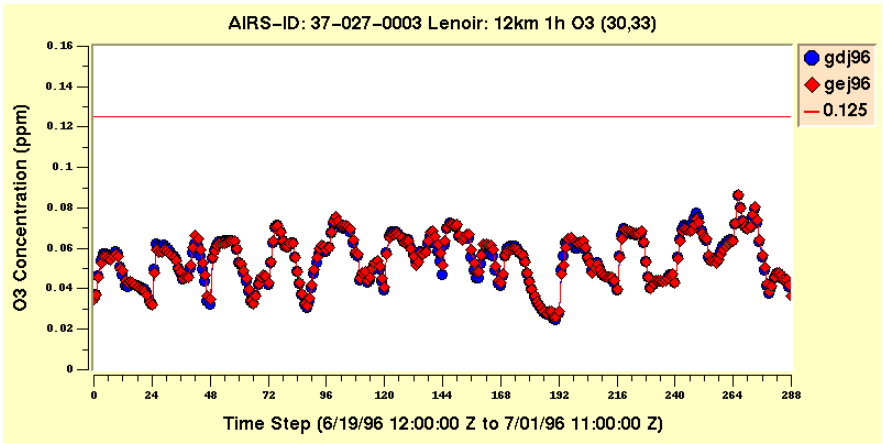

AIRS-ID: 37-003-0003 State Rd. 1177, Alexander Co.: 4km 8h O3 (39,41)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

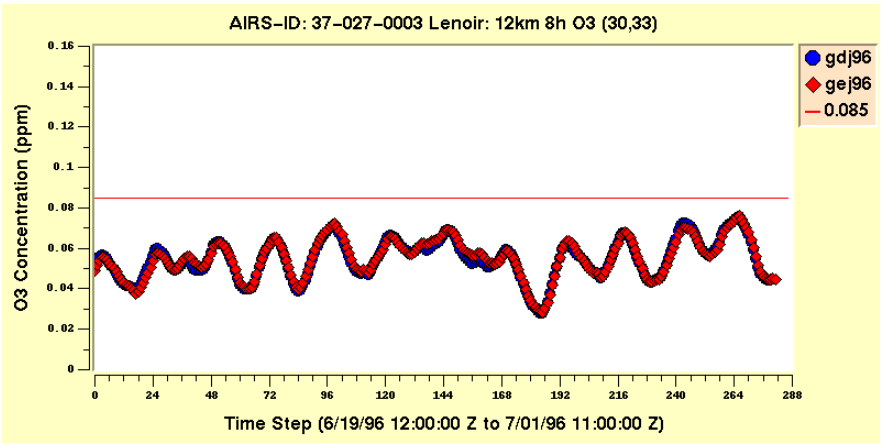

AIRS-ID: 37-003-0003 State Rd. 1177, Alexander Co.: 4km 1h O3 (27,41)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

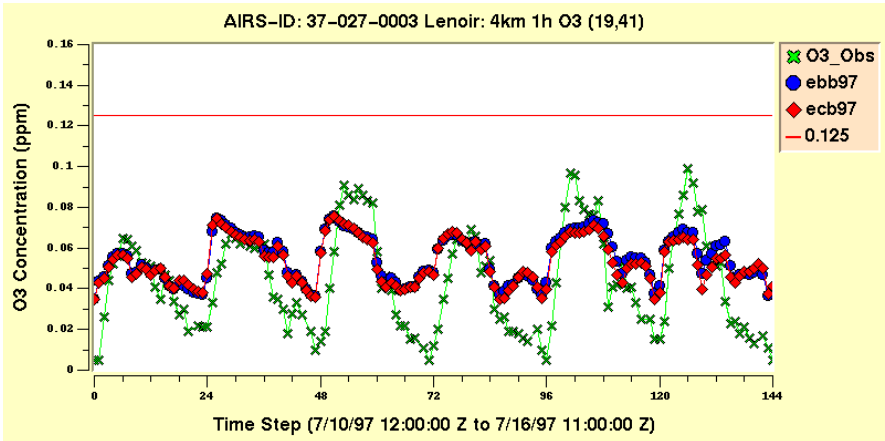

AIRS-ID: 37-003-0003 State Rd. 1177, Alexander Co.: 4km 8h O3 (27,41)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

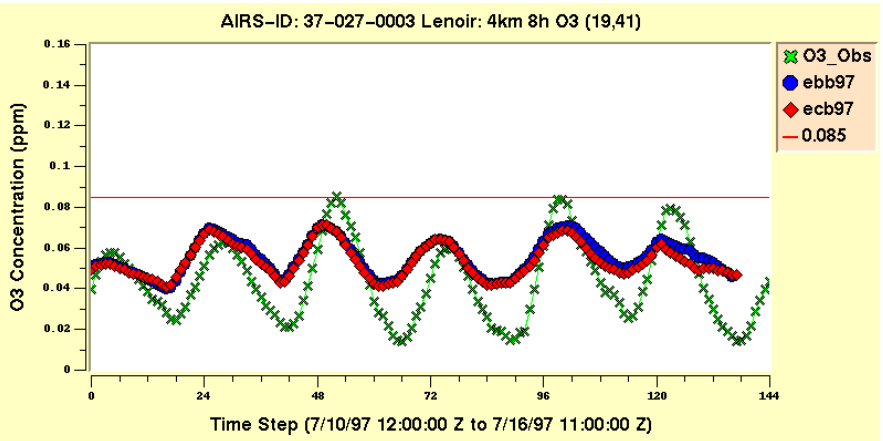

AIRS-ID: 37-027-0003 Lenoir: 4km 1h O3 (19,41)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125


AIRS-ID: 37-027-0003 Lenoir: 4km 8h O3 (19,41)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

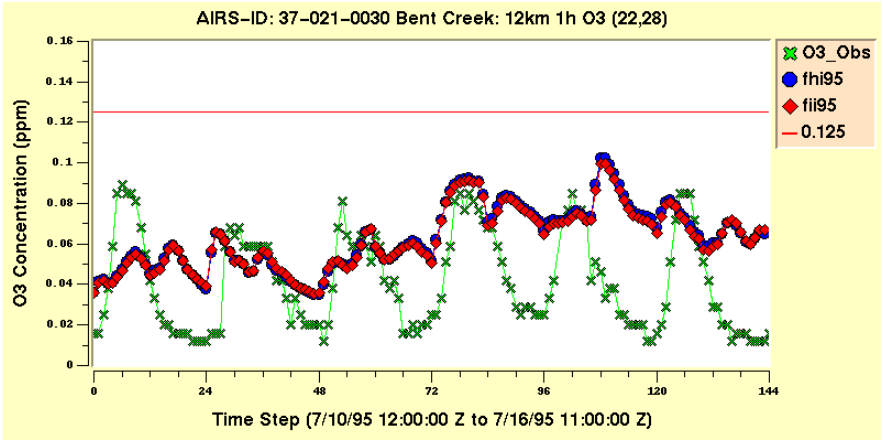

AIRS-ID: 37-027-0003 Lenoir: 12km 1h O3 (30,33)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
gdj96
gej96
0.125

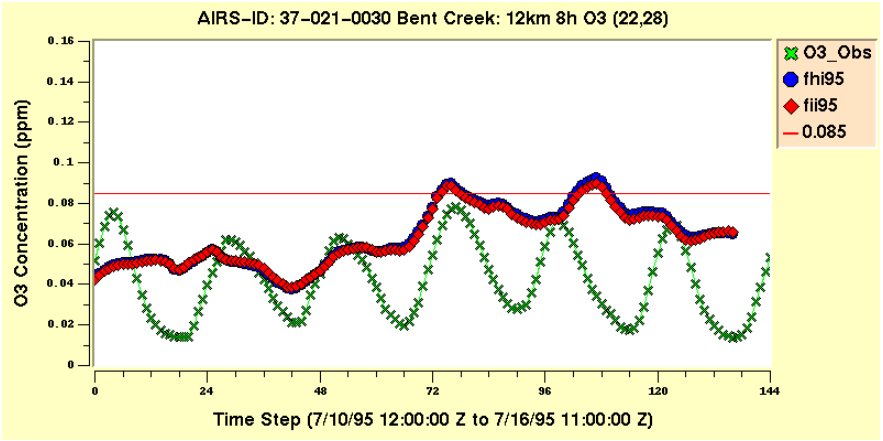

AIRS-ID: 37-027-0003 Lenoir: 12km 8h O3 (30,33)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
gdj96
gej96
0.085

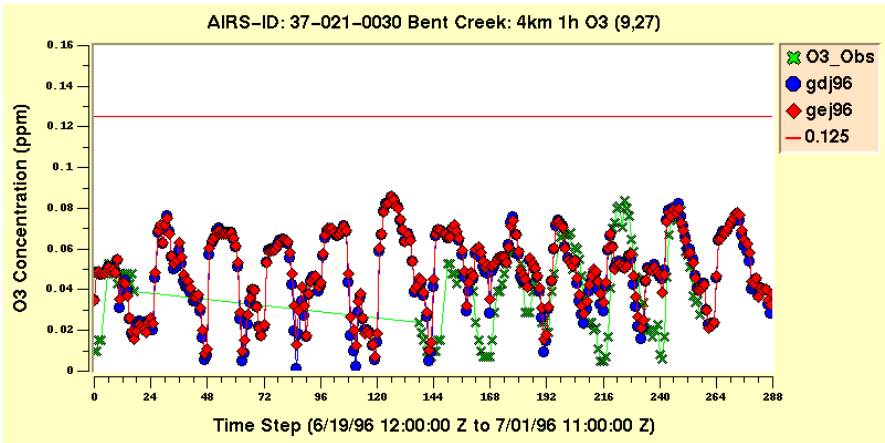

AIRS-ID: 37-027-0003 Lenoir: 4km 1h O3 (19,41)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

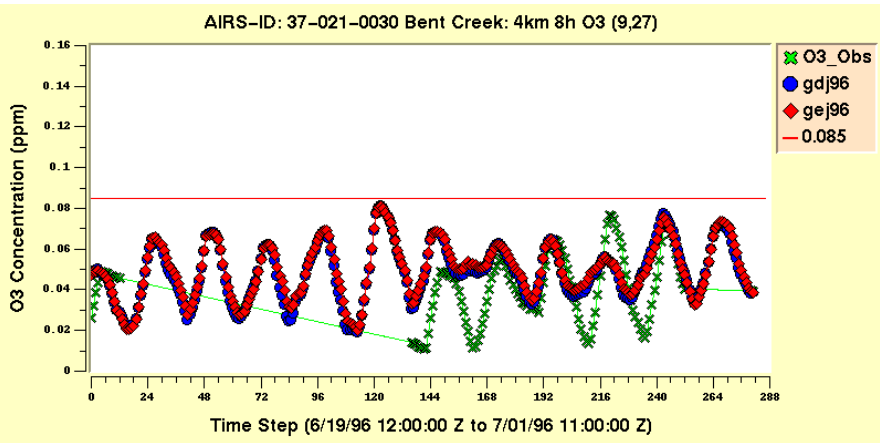

AIRS-ID: 37-027-0003 Lenoir: 4km 8h O3 (19,41)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

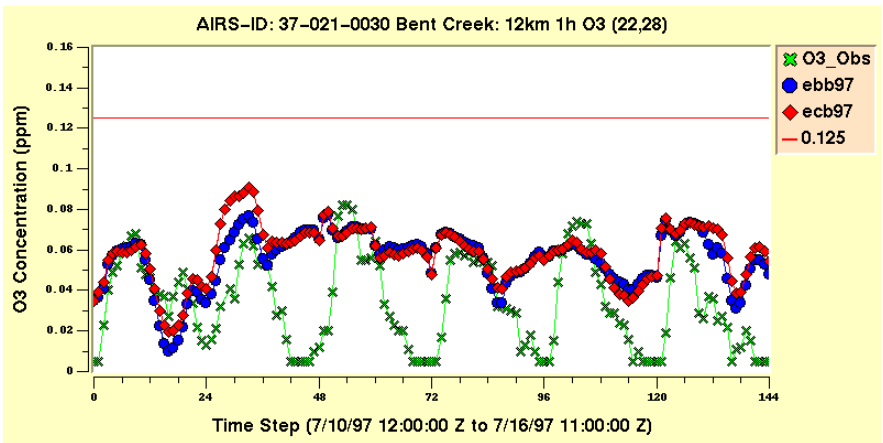
Mountain EAC Area
Time Series Plots

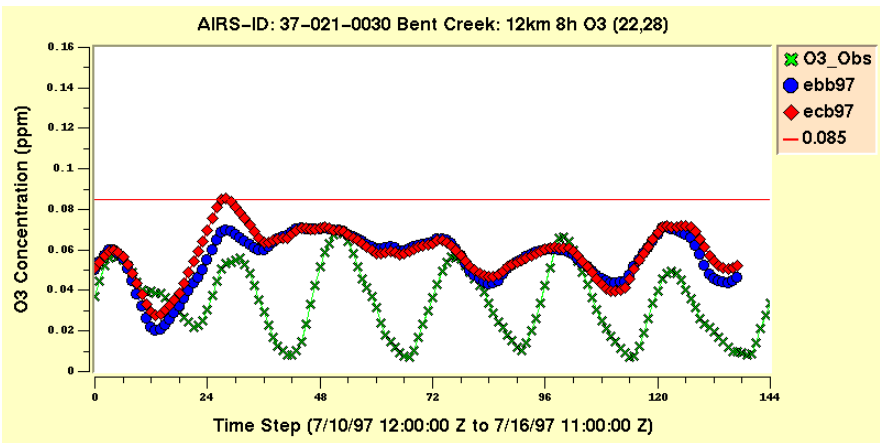

AIRS-ID: 37-021-0030 Bent Creek: 12km 1h O3 (22,28)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125

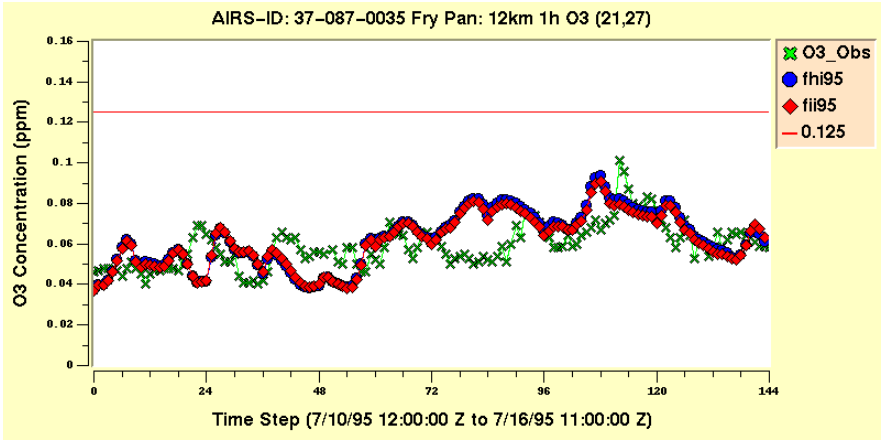

AIRS-ID: 37-021-0030 Bent Creek: 12km 8h O3 (22,28)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

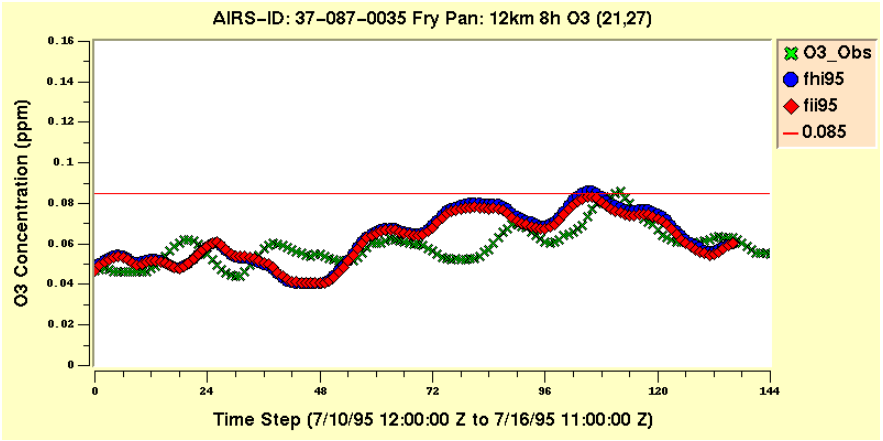

AIRS-ID: 37-021-0030 Bent Creek: 4km 1h O3 (9,27)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

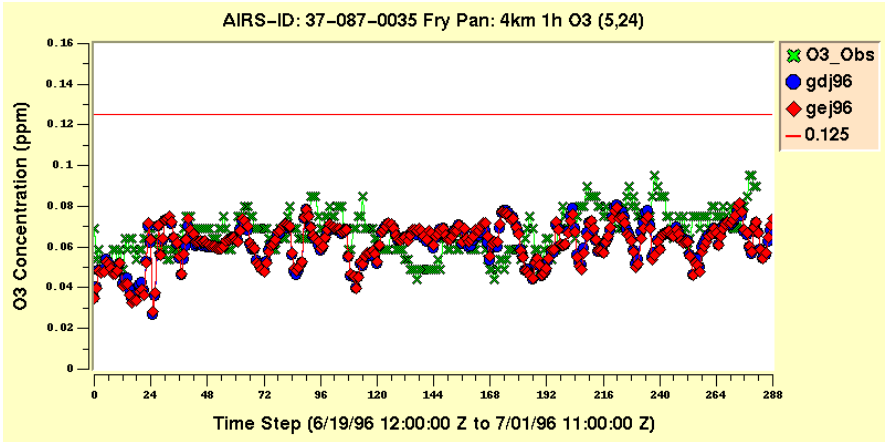

AIRS-ID: 37-021-0030 Bent Creek: 4km 8h O3 (9,27)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

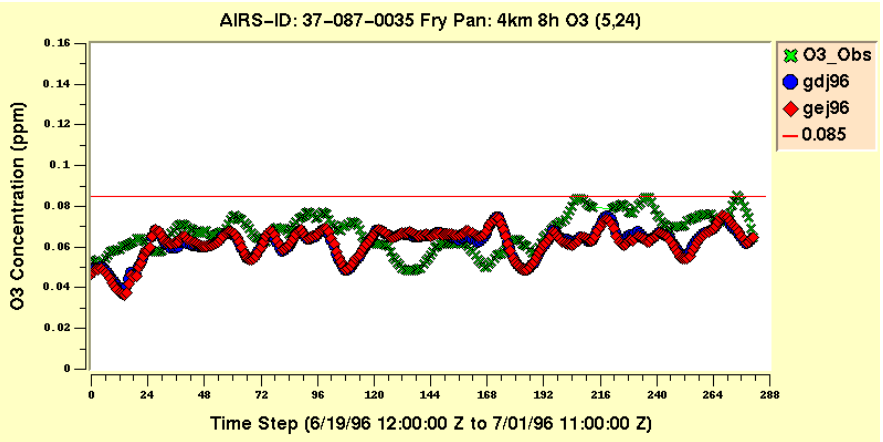

AIRS-ID: 37-021-0030 Bent Creek: 12km 1h O3 (22,28)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

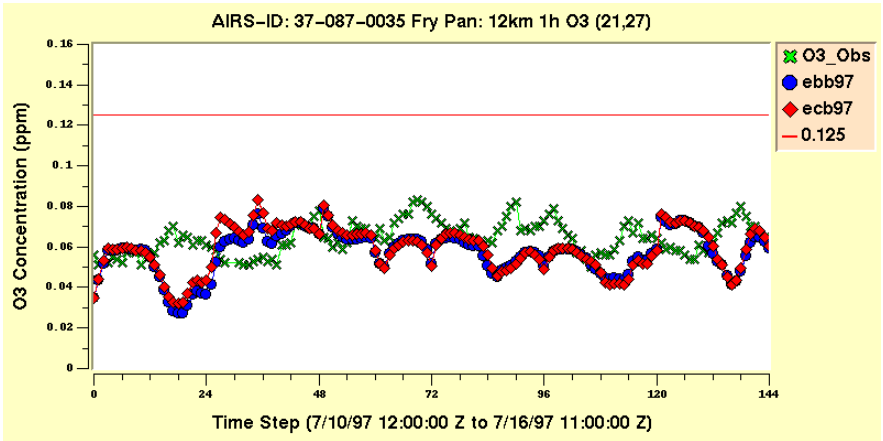

AIRS-ID: 37-021-0030 Bent Creek: 12km 8h O3 (22,28)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

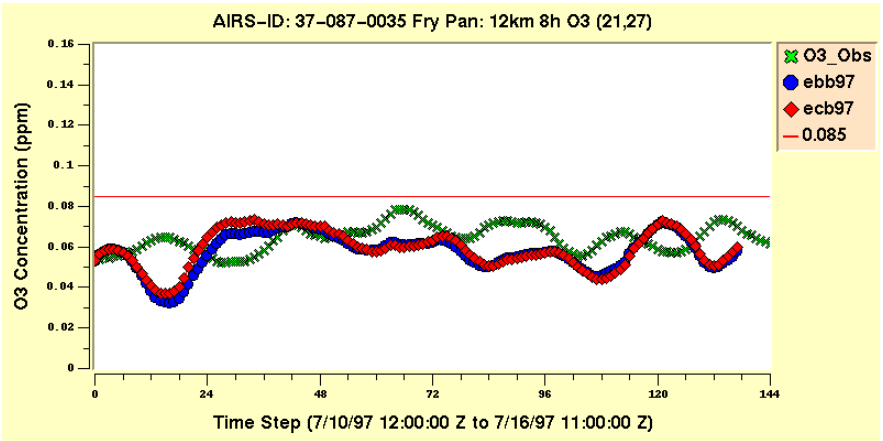

AIRS-ID: 37-087-0035 Fry Pan: 12km 1h O3 (21,27)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125

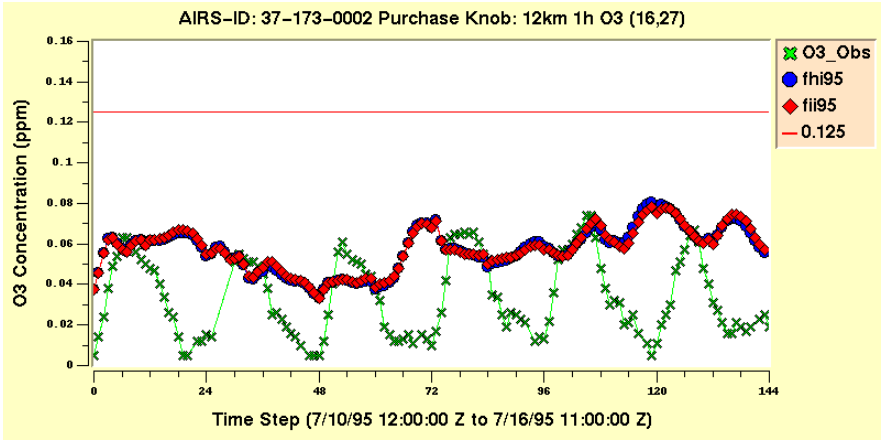

AIRS-ID: 37-087-0035 Fry Pan: 12km 8h O3 (21,27)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

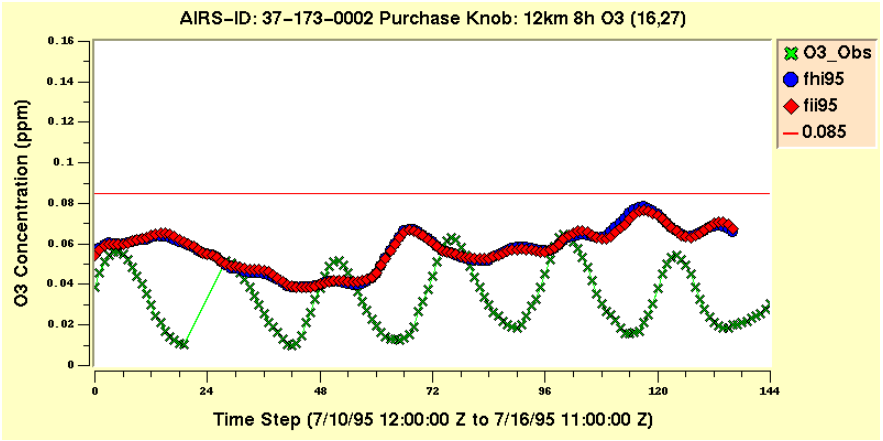

AIRS-ID: 37-087-0035 Fry Pan: 4km 1h O3 (5,24)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

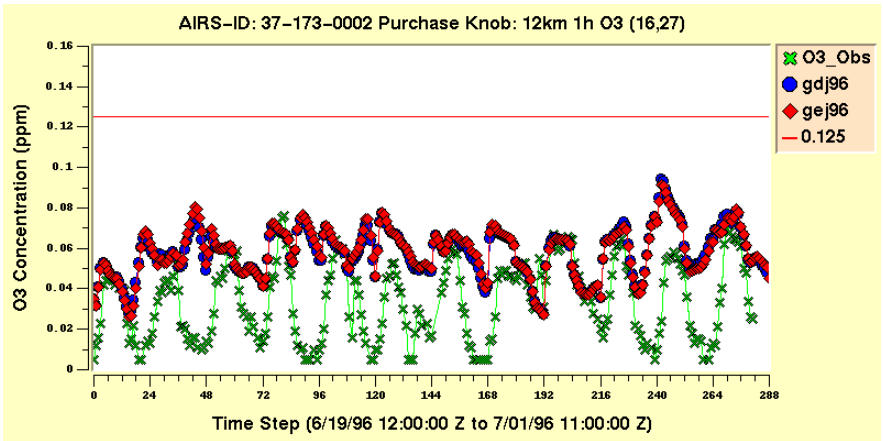

AIRS-ID: 37-087-0035 Fry Pan: 4km 8h O3 (5,24)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

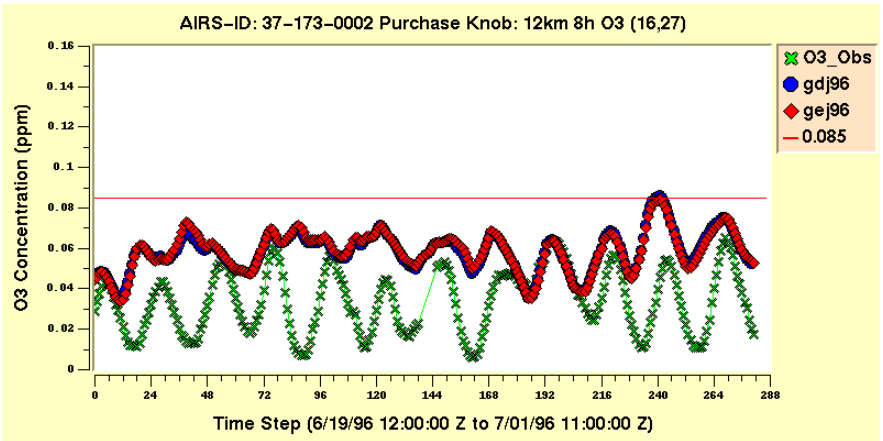

AIRS-ID: 37-087-0035 Fry Pan: 12km 1h O3 (21,27)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

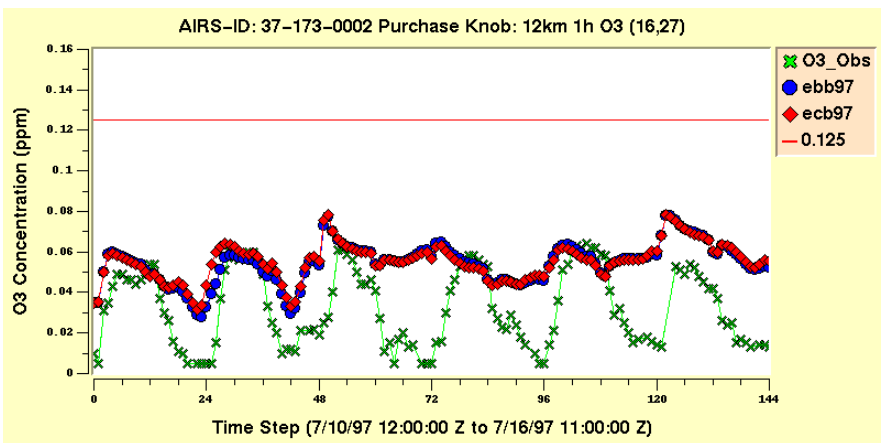

AIRS-ID: 37-087-0035 Fry Pan: 12km 8h O3 (21,27)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

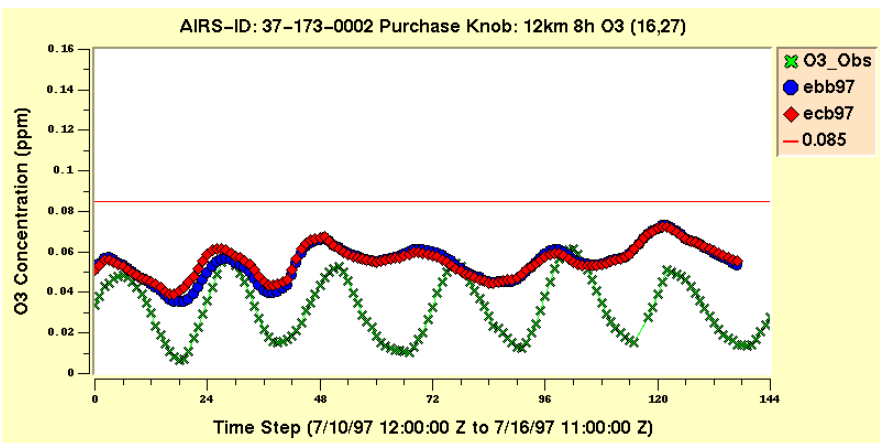

AIRS-ID: 37-173-0002 Purchase Knob: 12km 1h O3 (16,27)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125

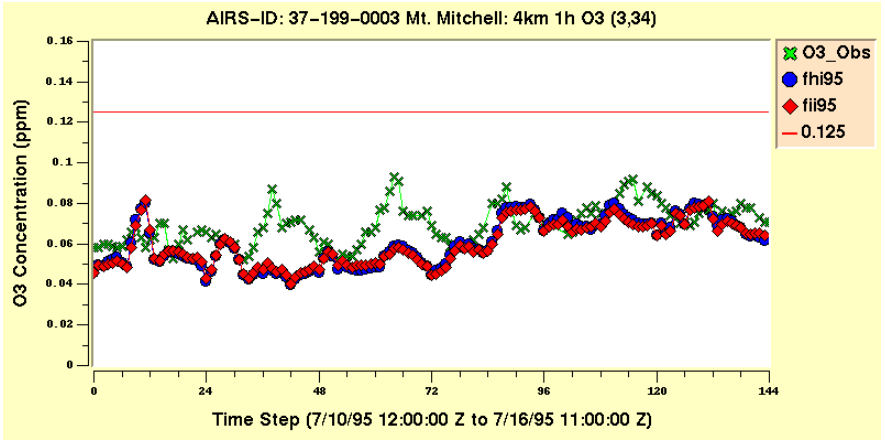

AIRS-ID: 37-173-0002 Purchase Knob: 12km 8h O3 (16,27)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

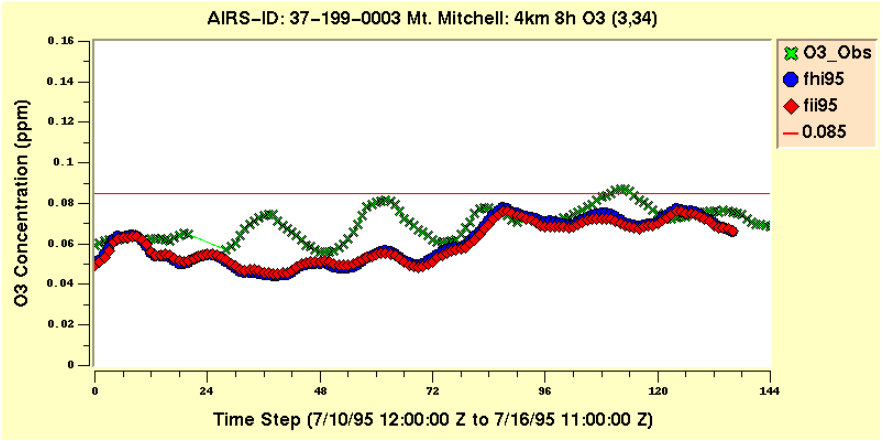

AIRS-ID: 37-173-0002 Purchase Knob: 12km 1h O3 (16,27)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

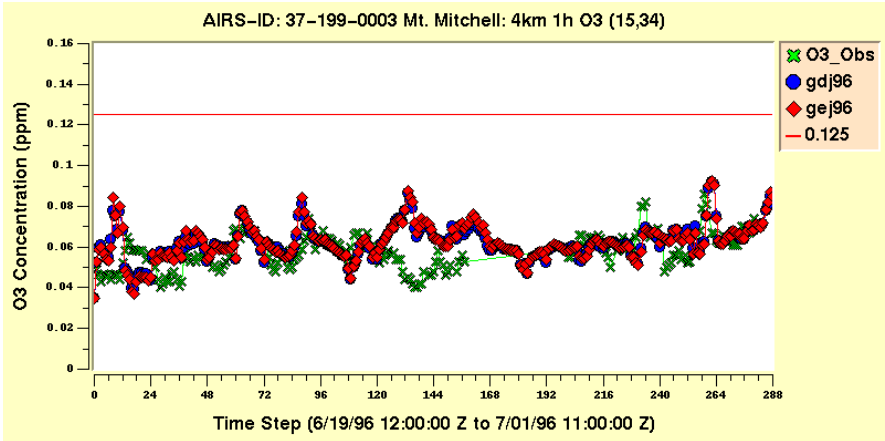

AIRS-ID: 37-173-0002 Purchase Knob: 12km 8h O3 (16,27)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

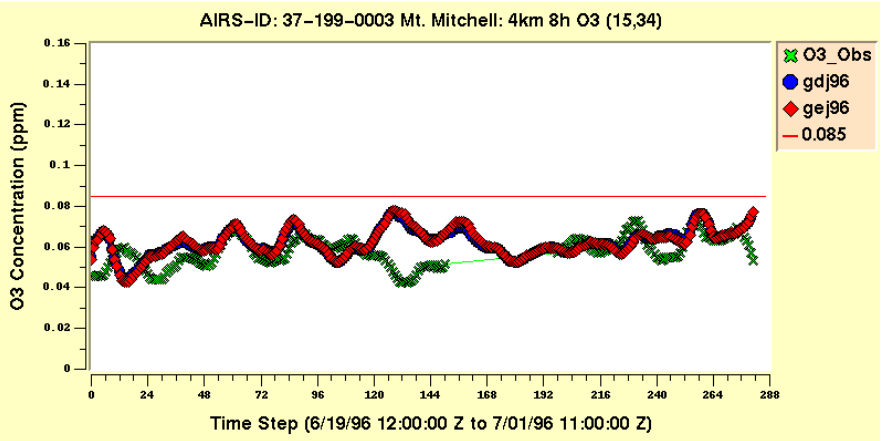

AIRS-ID: 37-173-0002 Purchase Knob: 12km 1h O3 (16,27)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

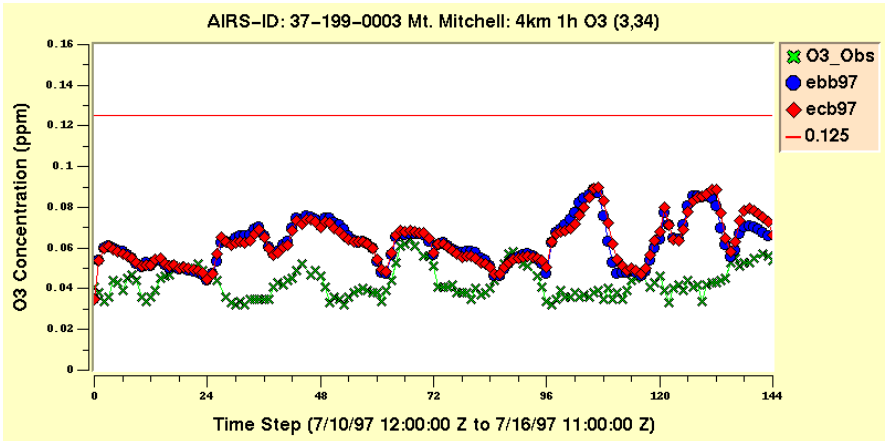

AIRS-ID: 37-173-0002 Purchase Knob: 12km 8h O3 (16,27)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

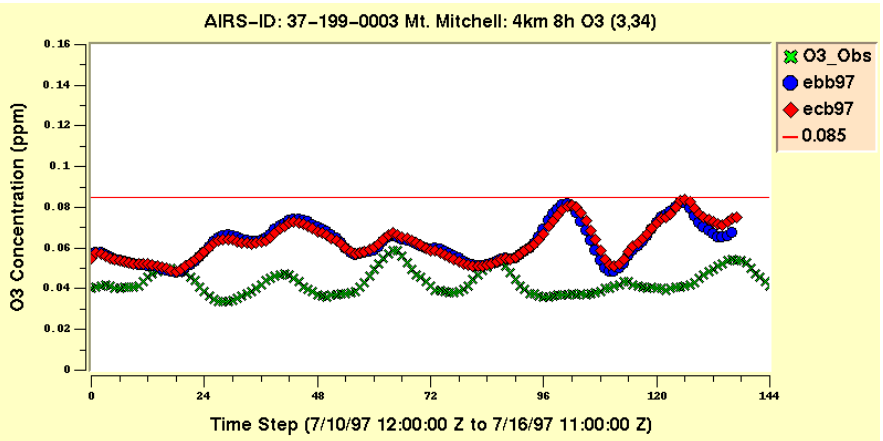

AIRS-ID: 37-199-0003 Mt. Mitchell: 4km 1h O3 (3,34)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125

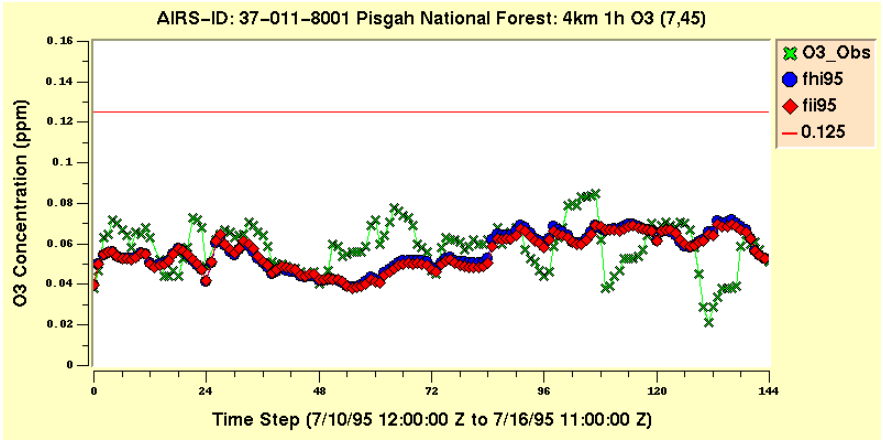

AIRS-ID: 37-199-0003 Mt. Mitchell: 4km 8h O3 (3,34)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

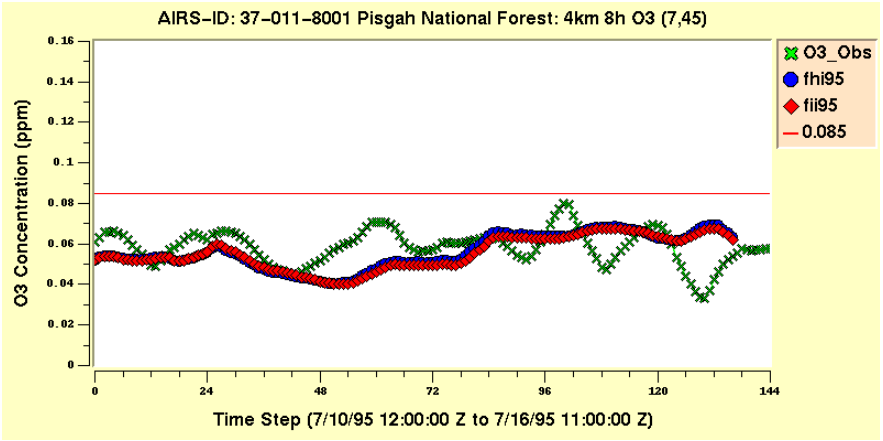

AIRS-ID: 37-199-0003 Mt. Mitchell: 4km 1h O3 (15,34)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125


AIRS-ID: 37-199-0003 Mt. Mitchell: 4km 8h O3 (15,34)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

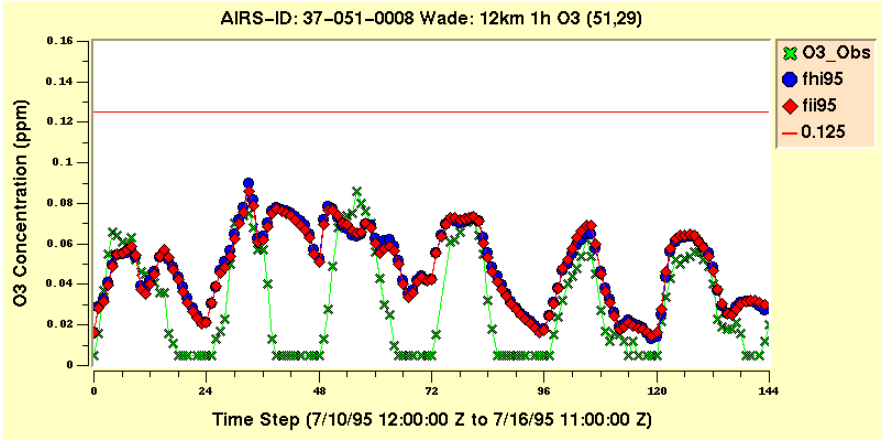

AIRS-ID: 37-199-0003 Mt. Mitchell: 4km 1h O3 (3,34)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

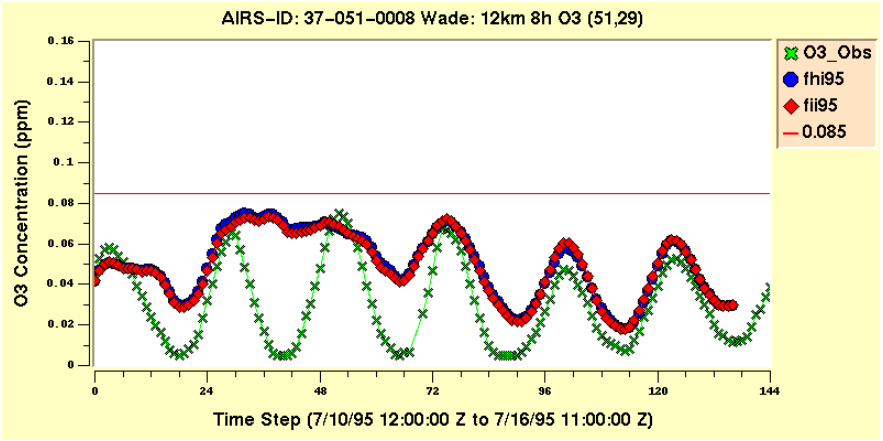

AIRS-ID: 37-199-0003 Mt. Mitchell: 4km 8h O3 (3,34)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

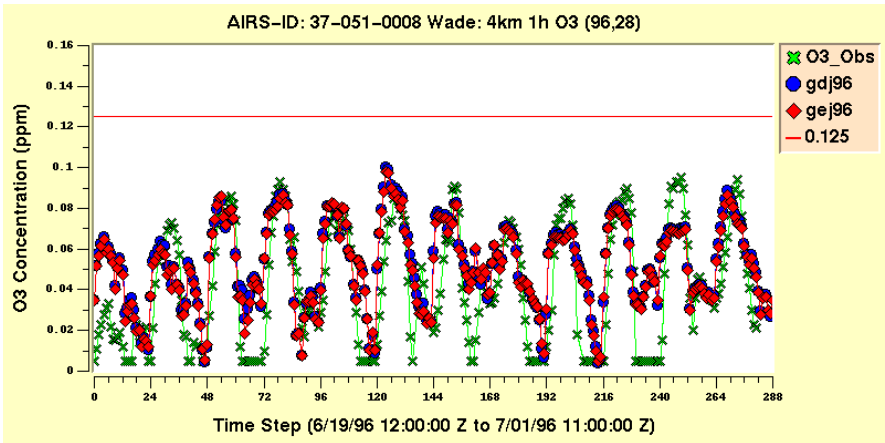

AIRS-ID: 37-011-8001 Pisgah National Forest: 4km 1h O3 (7,45)
O3 Concentration (ppm)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
24
48
72
96
120
144
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125

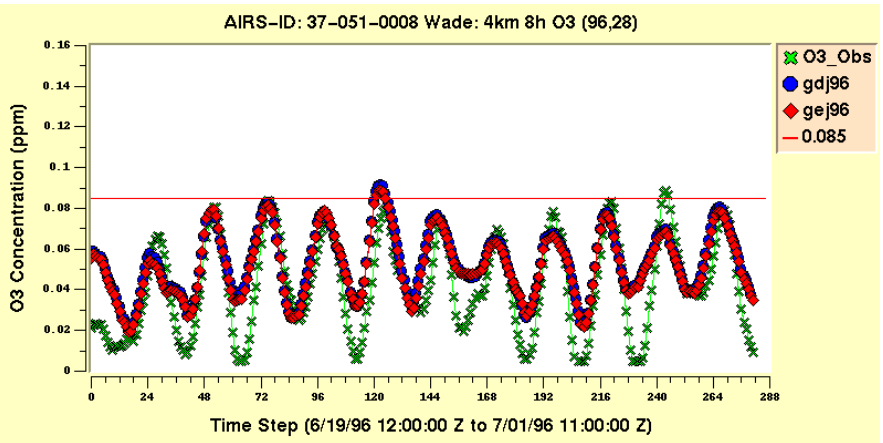

AIRS-ID: 37-011-8001 Pisgah National Forest: 4km 8h O3 (7,45)
O3 Concentration (ppm)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
24
48
72
96
120
144
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

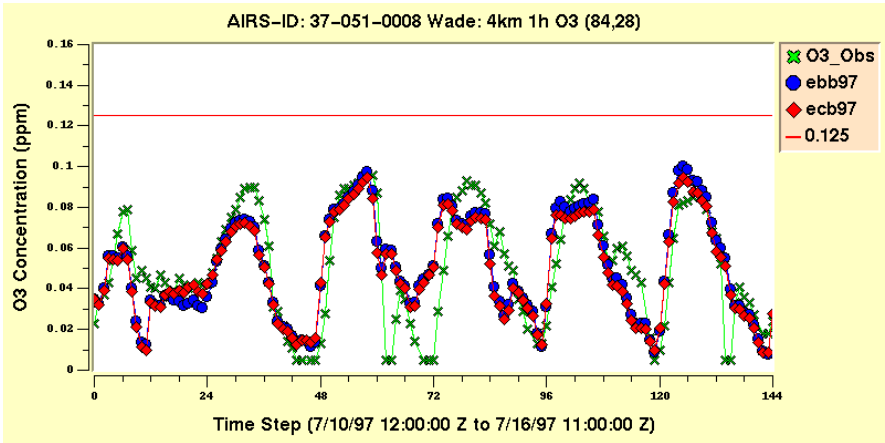
Fayetteville EAC Area
Time Series Plots

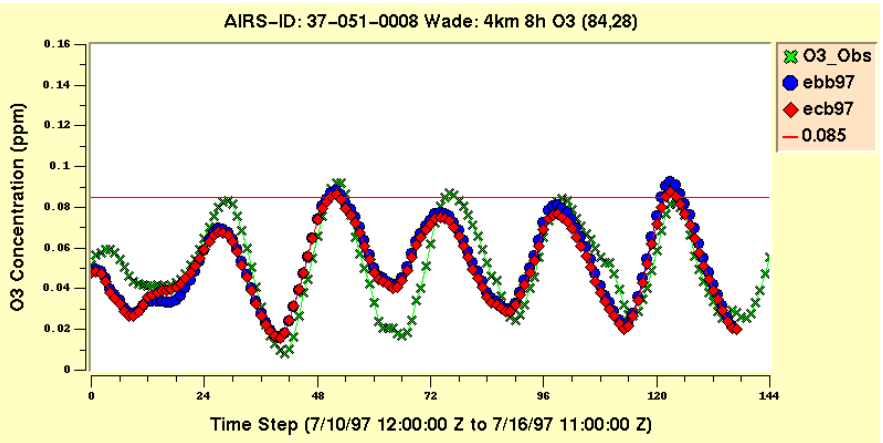

AIRS-ID: 37-051-0008 Wade: 12km 1h O3 (51,29)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125

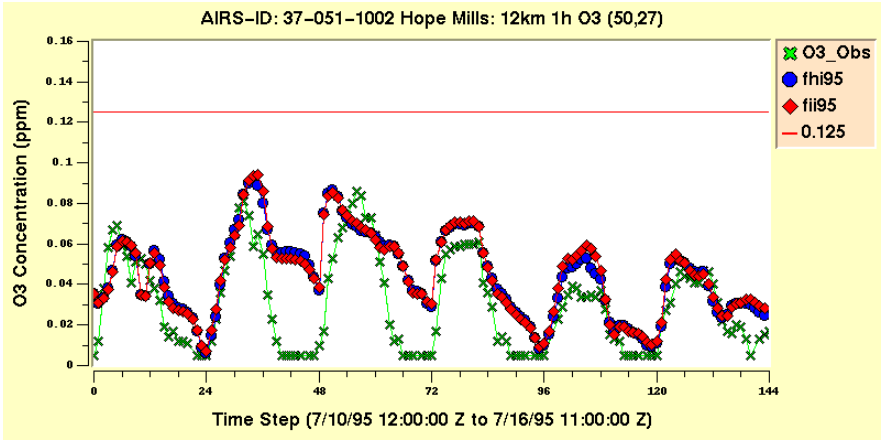

AIRS-ID: 37-051-0008 Wade: 12km 8h O3 (51,29)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085

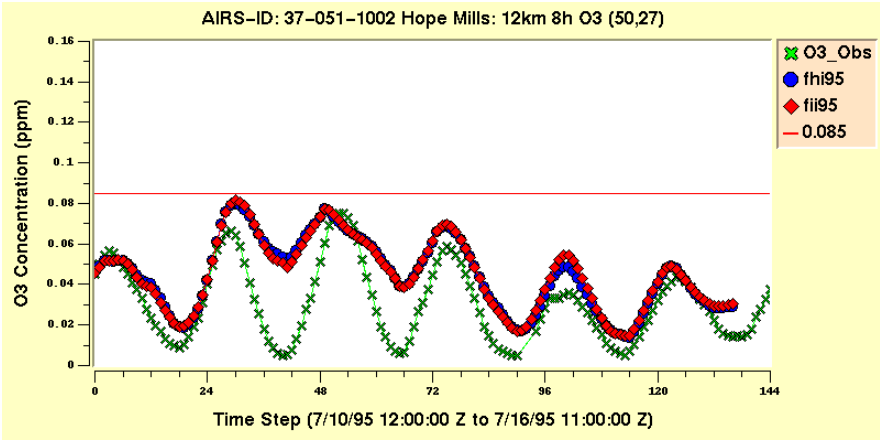

AIRS-ID: 37-051-0008 Wade: 4km 1h O3 (96,28)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125

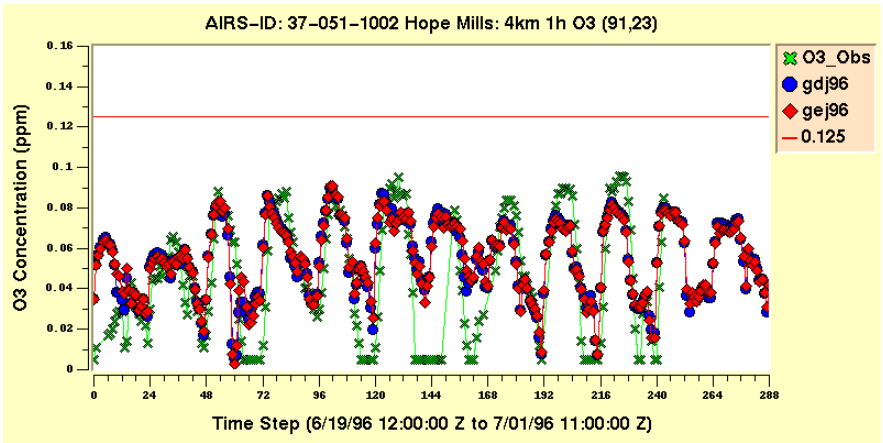

AIRS-ID: 37-051-0008 Wade: 4km 8h O3 (96,28)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085

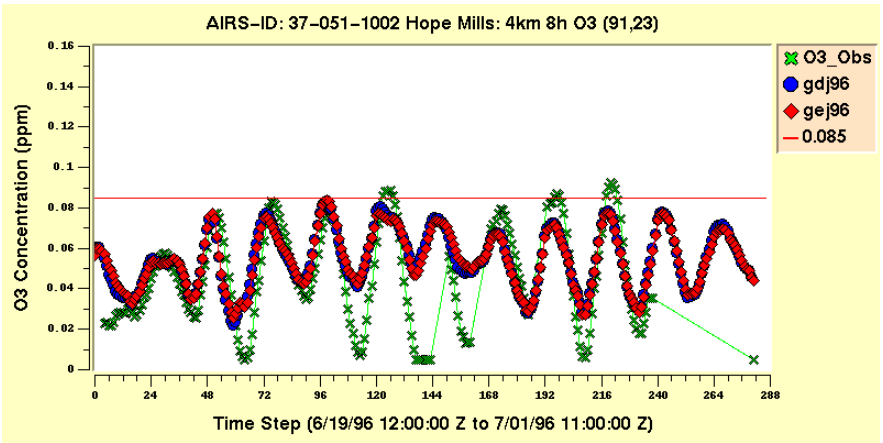

AIRS-ID: 37-051-0008 Wade: 4km 1h O3 (84,28)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125

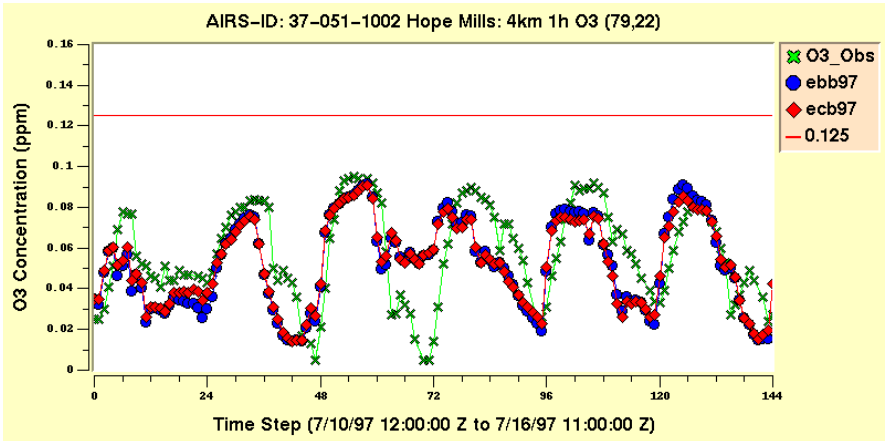

AIRS-ID: 37-051-0008 Wade: 4km 8h O3 (84,28)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085

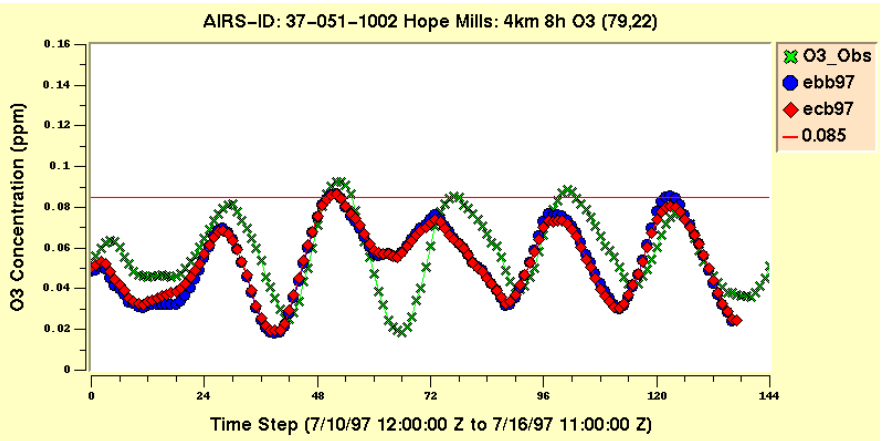

AIRS-ID: 37-051-1002 Hope Mills: 12km 1h O3 (50,27)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.125


AIRS-ID: 37-051-1002 Hope Mills: 12km 8h O3 (50,27)
O3 Concentration (ppm)
Time Step (7/10/95 12:00:00 Z to 7/16/95 11:00:00 Z)
O3_Obs
fhi95
fii95
0.085


AIRS-ID: 37-051-1002 Hope Mills: 4km 1h O3 (91,23)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.125


AIRS-ID: 37-051-1002 Hope Mills: 4km 8h O3 (91,23)
O3 Concentration (ppm)
Time Step (6/19/96 12:00:00 Z to 7/01/96 11:00:00 Z)
O3_Obs
gdj96
gej96
0.085


AIRS-ID: 37-051-1002 Hope Mills: 4km 1h O3 (79,22)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.125


AIRS-ID: 37-051-1002 Hope Mills: 4km 8h O3 (79,22)
O3 Concentration (ppm)
Time Step (7/10/97 12:00:00 Z to 7/16/97 11:00:00 Z)
O3_Obs
ebb97
ecb97
0.085